

# THE RAILWAY GAZETTE

Price: Two Shillings

FRIDAY, SEPTEMBER 22, 1961

Annually £5 by post

## Modernisation in practice



One of the 2,000 h.p. 1 Co-Co 1 Type 4 diesel-electric locomotives supplied by 'ENGLISH ELECTRIC' to the Eastern Region of British Railways shown hauling the 'Master Cutler'.

Two hundred of these 2,000 h.p. diesel-electric locomotives were ordered from 'ENGLISH ELECTRIC'. They are used to haul express passenger trains for most regions of British Railways.

## 'ENGLISH ELECTRIC'

in association with VULCAN FOUNDRY · ROBERT STEPHENSON & HAWTHORNS

# FIVE more PULLMAN trains



Following the Diesel Pullmans, Metro-Cammell has now supplied ALL the Rolling Stock for:

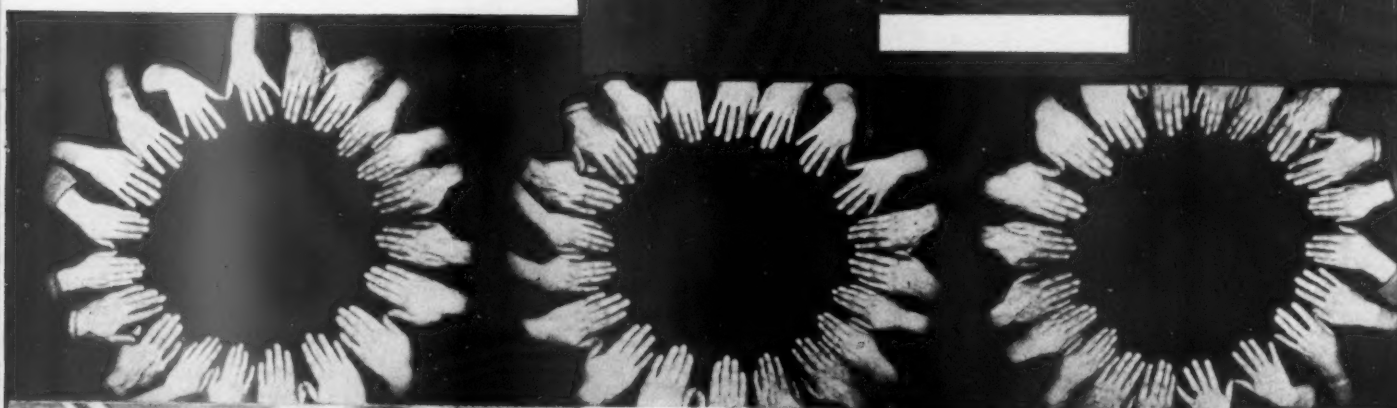
- THE "MASTER CUTLER"
- THE "YORKSHIRE PULLMAN"
- THE "TEES-TYNE PULLMAN"
- THE "QUEEN-OF-SCOTS" PULLMANS



**METROPOLITAN-CAMMELL CARRIAGE & WAGON CO. LTD.**

HEAD OFFICE: SALTLEY • BIRMINGHAM 8 • LONDON OFFICE: VICKERS HOUSE • BROADWAY • WESTMINSTER S.W.1

# DO YOU KNOW...



## PRODUCTION

It takes at least thirty people—thirty pairs of skilled hands—to make one DORMER Drill. Every operation is performed by experienced operators with the most up-to-date machinery. Careful heat-treatment and inspection are equally essential in maintaining the consistently high standard of DORMER Tools.

At least one in every ten people employed in the manufacture of DORMER Drills is an inspector. Throughout production and before each DORMER Tool leaves the works, every part is checked in minute detail.

## INSPECTION

## PERFORMANCE

With correct use, a DORMER Drill of 1" diameter, in its lifetime on general purpose work, will remove 2,800 times its own weight in material (over 1.¼ tons), and drill a total length of hole five hundred yards long!



# DORMER

## TWIST DRILLS

THE FINEST BY ANY STANDARD

THE SHEFFIELD TWIST DRILL AND STEEL COMPANY LIMITED  
SHEFFIELD, ENGLAND  
YOUR LOCAL AGENT OR DIRECT FROM YOUR LOCAL ENGINEERING MERCHANTS



# Crewe — Liverpool Electrification

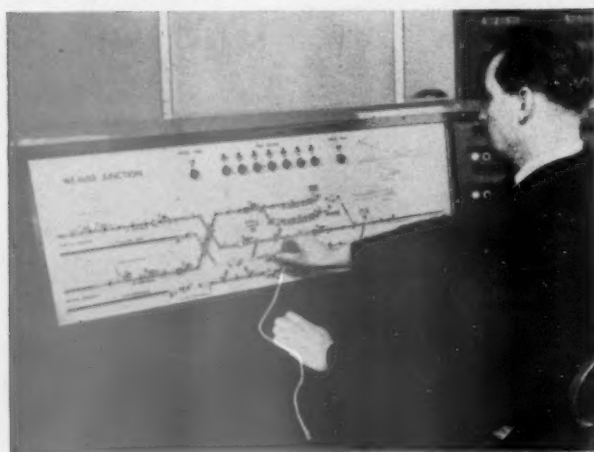


Miniature push-button desk at Edge Hill controlling some 170 routes.

Stage II of the London Midland Region of British Railways 25kV 50 cycle A.C. Electrification Programme

## ANOTHER WESTINGHOUSE SIGNALLING INSTALLATION

Miniature push-button desk at Weaver Junction controlling some 21 routes.



includes the section from Edge Hill, Liverpool, to just north of Crewe. Miniature type push-button control desks at Edge Hill and Weaver Junction and modernisation of 22 electro-mechanical signal boxes, provide control of 246 colour light signals, 77 electro-pneumatic point ends, 687 track circuits. Several thousands of the latest type miniature plug-in relays have been used throughout this installation.

**WESTINGHOUSE BRAKE AND SIGNAL CO. LTD., 82 York Way, King's Cross, London, N.1**  
 Saxby & Farmer (India) Private Ltd., Calcutta. McKenzie & Holland (Australia) Pty., Ltd., Melbourne.  
 Westinghouse Brake & Signal Co., S.A. (Pty.) Ltd., Johannesburg. Agents—Bellamy & Lambie, Johannesburg.





**the big lift....**

**Cowans Sheldon**  
**250 Ton Diesel**  
**Railway Breakdown crane**

There's BIG capacity for hard work in this Cowans, Sheldon 250 Ton Diesel-Hydraulic Breakdown Crane. This, the largest railway crane to come out of Great Britain, was completed in 9 months, and together with a smaller 150 ton version, is for the Quebec Cartier Mining Company. For reliable Cranes of all types, and for speedy delivery, consult Cowans Sheldon, the Crane Specialists.

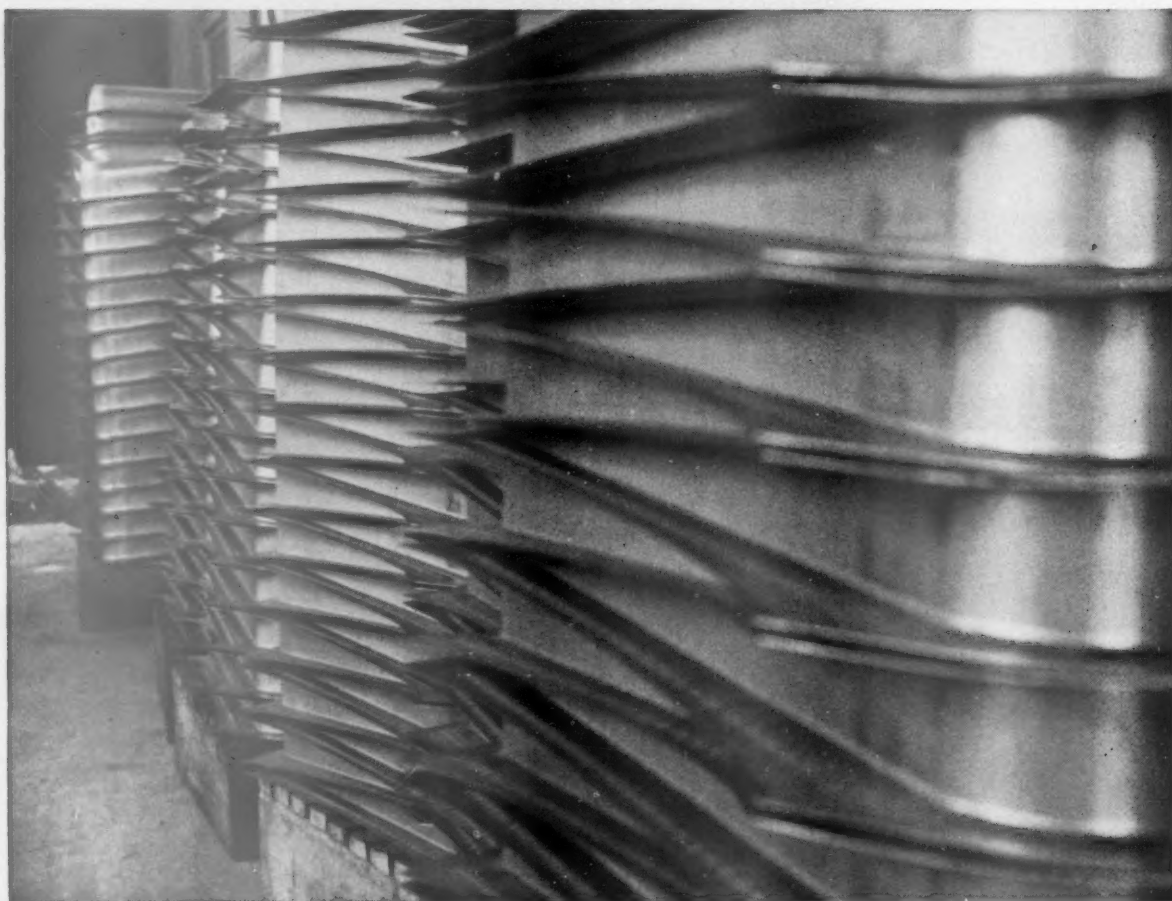
**DIESEL AND STEAM BREAKDOWN CRANES**  
**HEAVY RAILWAY WORKSHOP EQUIPMENT**  
**DOCKSIDE AND SHIPYARD CRANES**

**COWANS SHELTON**



COWANS, SHELTON & CO. LTD.,  
CARLISLE · ENGLAND  
TELEPHONE: CARLISLE 24196-9  
LONDON OFFICE: AFRICA HOUSE, KINGSWAY, W.C.2  
TELEPHONE: HOLBORN 0269

## IMPROVED RESISTANCE TO CORROSION...



*Photograph by courtesy Lec Refrigeration Ltd*

**Another reason why industry is changing over to**

# DRAGONITE

**ELECTRO-ZINC COATED SHEET STEEL**

Atmospheric corrosion has always been a problem where the storing of sheet steel is concerned. It's a problem which Dragonite goes a long way to solving.

The steel core of Dragonite is protected by a film of pure zinc which corrodes at a much slower rate than steel. Thus Dragonite can be kept in store far longer than ordinary, uncoated sheet steel without danger of deterioration.

Even after deep drawing or pressing Dragonite is still well protected against corrosion, because the incredibly thin film of zinc is so ductile that it is not cracked or damaged by fabrication.

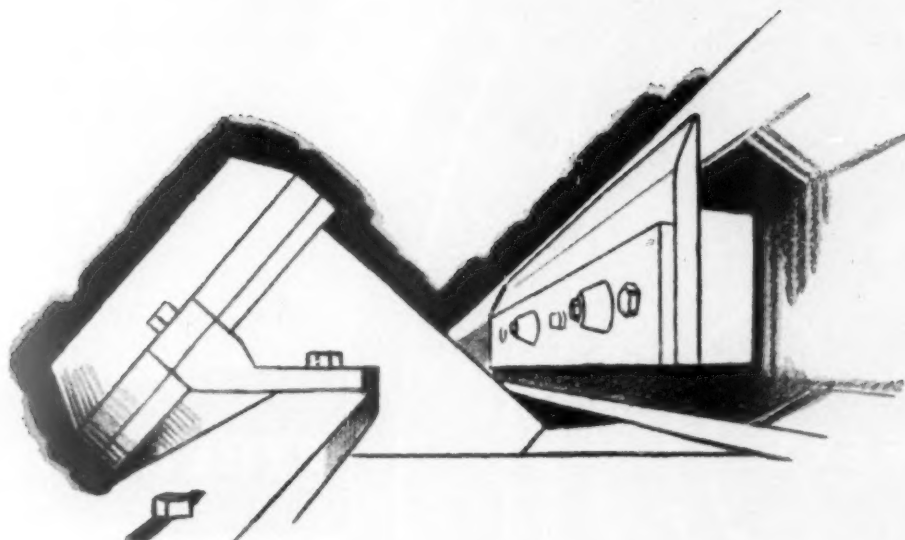
There are many more good reasons why you should be using Dragonite. For fuller details, please write for a copy of the *Dragonite Technical Handbook* to:

These are some of the industries in which Dragonite is being used extensively: Domestic Appliances; Electrical Industry; Automobiles; Radio Equipment; Office Furniture.



## THE STEEL COMPANY OF WALES LIMITED

Sales Offices: United Kingdom — Abbey Works, Port Talbot, Glamorgan. Overseas — Margam House, 26 St. James's Square, London, S.W.1



## **P. & M. Rail & Flange Lubricator**

P. & M. Rail and Flange Lubricators give unfailing lubrication just where it is needed most. Each wheel *automatically* receives its proper share of grease to ensure minimum wear on flanges and rails:

- the life of curve rails is increased up to 5 times.
- the life of wheel flanges is increased up to 10 times.
- P. & M. Lubricators are supplied to suit all types of track—for running rail or check rail lubrication.
- P. & M. Lubricators give efficient results on lines carrying light or heavy traffic at high or low speeds.



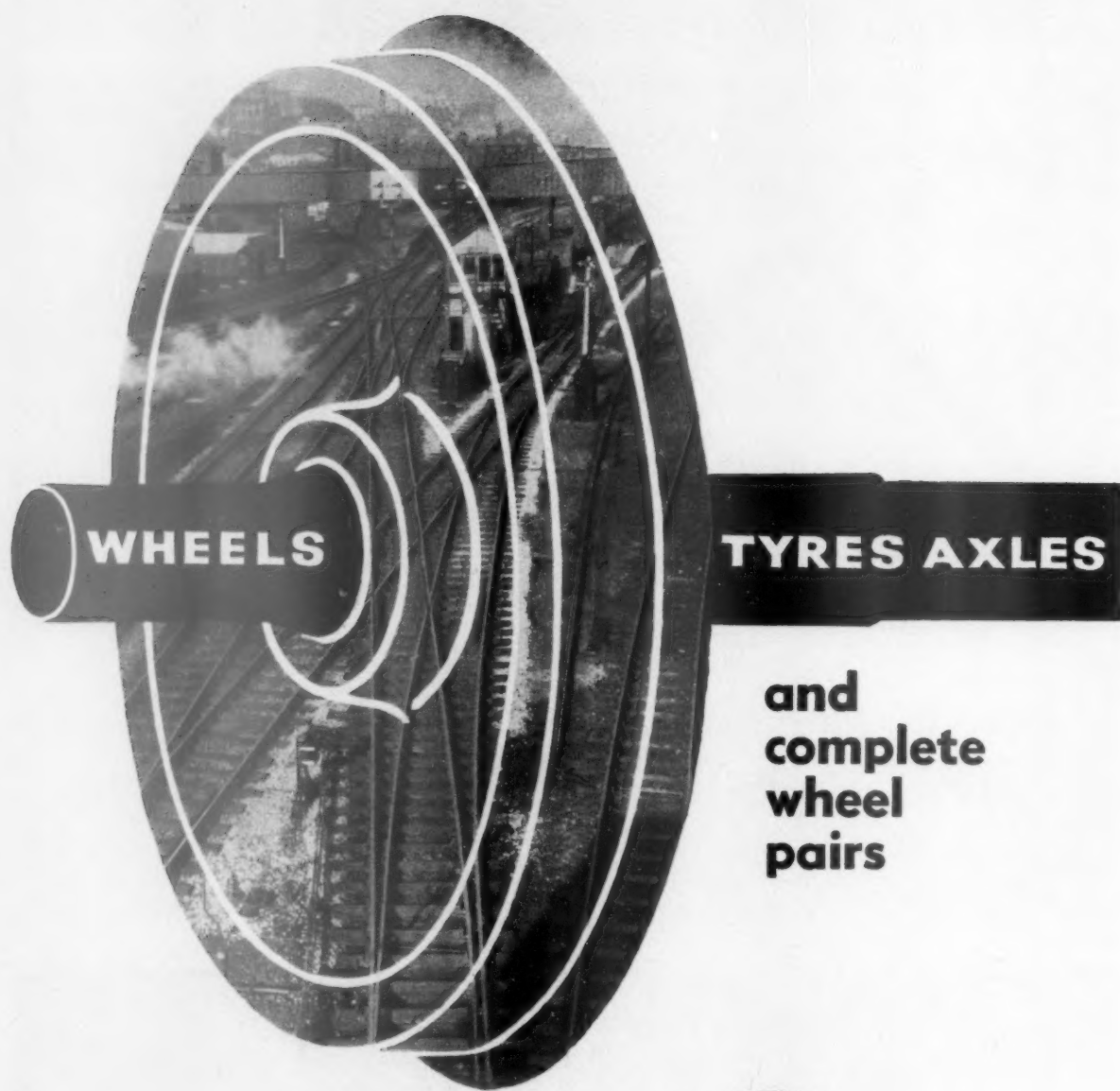
**THE P. & M. CO.**

(ENGLAND) LTD.

**1a GROSVENOR GARDENS, LONDON, S.W.1**

R.F.L./2





*for the railways of the world*



**Taylor** **BROS. & CO. LTD**  
TRAFFORD PARK STEELWORKS, MANCHESTER 17

ALSO

**Makers of Seamless Rings and Circular Die Forgings**

LONDON OFFICE: ST. ERMIN'S, CAXTON STREET, WESTMINSTER, S.W.1

# **BICC** Telecommunication Cables *for Railway Modernization*

BICC are specialists in the design of screened cable systems for use in the difficult induction environment of A.C. electrification.

Modern railway communications demand increasing bandwidth for long distance circuits—BICC small diameter coaxial pairs meet this demand.

Detailed information is available on request. Publication 437 describes BICC standard screening designs and their applications. Publication 422 gives details of small diameter coaxial cable designs including composite types.



Typical aluminium sheathed and steel screened composite cable incorporating small diameter coaxial pairs.

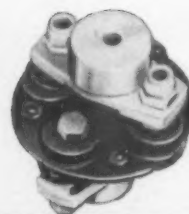
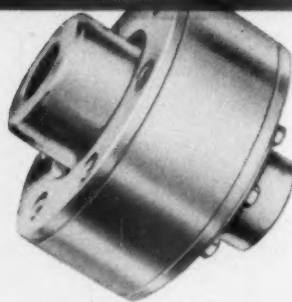
**British Insulated Callender's Cables Limited**  
**21 Bloomsbury Street, London, W.C.1**



Whenever a power transmission system is susceptible to angular or linear misalignment or significant vibration, there is a Silentbloc Flexible Coupling to suit the case. The wide range and variety available from stock can be augmented by 'specials' to meet really unusual demands. Our advisory service is freely at your disposal without obligation.



*Come to us at the  
drawing-board stage*



## SILENTBLOC

**ANTI-VIBRATION DEVICES**

**FOR ROAD AND RAIL TRACTION  
INDUSTRY • MARINE APPLICATIONS  
INSTRUMENTATION • ELECTRONICS**

**SILENTBLOC LIMITED MANOR ROYAL CRAWLEY SUSSEX**

Telephone: Crawley 2100

Telegrams: Silentbloc Crawley

Andre Rubber Co. Ltd., is another Silentbloc Company.

Silentbloc products are also manufactured by Silentbloc (Australia) Pty. Ltd., Melbourne

Broadway S1114



# SLM

90 years experience  
in design and manufacture  
of locomotives and railcars!

# 50

of these 6000 HP Co-Co type locomotives are giving excellent service on the Gothard and the Simplon lines of the Swiss Federal Railways.

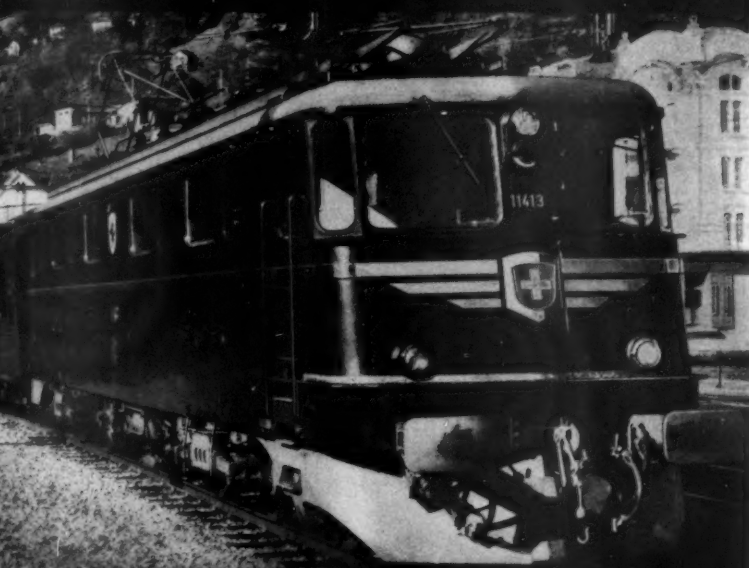
# 24

To meet traction requirements due to increasing traffic 24 more of these powerful and reliable engines have been ordered lately.

# 35

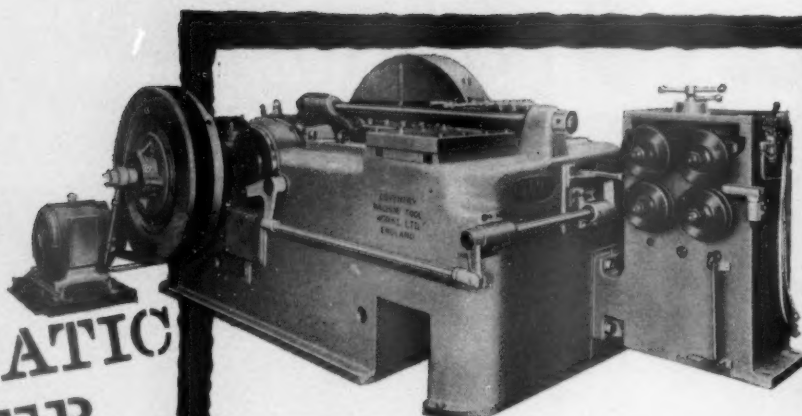
A further contract for the supply of 35 Diesel-electric locomotives, 600 HP each, fitted with SLM traction Diesel engines has also been placed by the Swiss Federal Railways.

Swiss  
Locomotive and Machine Works  
Winterthur





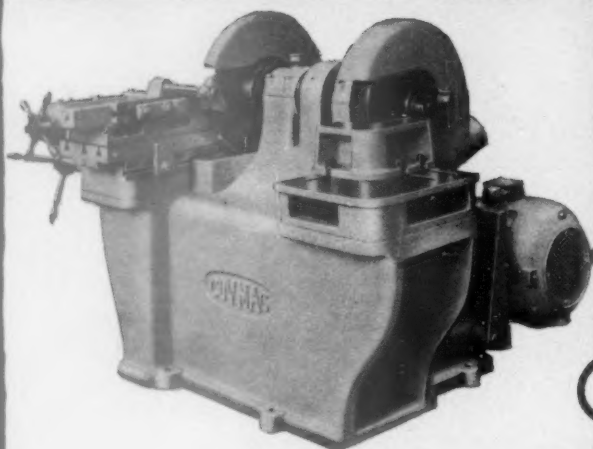
## AUTOMATIC FORGER



*No. 2 machine with guards removed.*

The stock is placed between the rolls and is then fed through the dies to the workstop. The die then closes, cutting off the stock to the required length, and delivers it to the heading position. The heading tool then completes the forging, which falls down the chute and is taken away by conveyor.

The Automatic Forger can be supplied in several sizes and for making balls of up to and including 4 in. diameter.



*No. 3 machine illustrated.*

These machines are made in three sizes. The smallest handles bars up to 2 in. diameter. The largest size, as illustrated, takes bars up to 4 in. diameter. They are an invaluable asset to any forging or drop stamping plant.

We also make nine sizes of Standard Upsetting

Machines to take bars from  $\frac{3}{4}$  in. to 6 in. diameter.



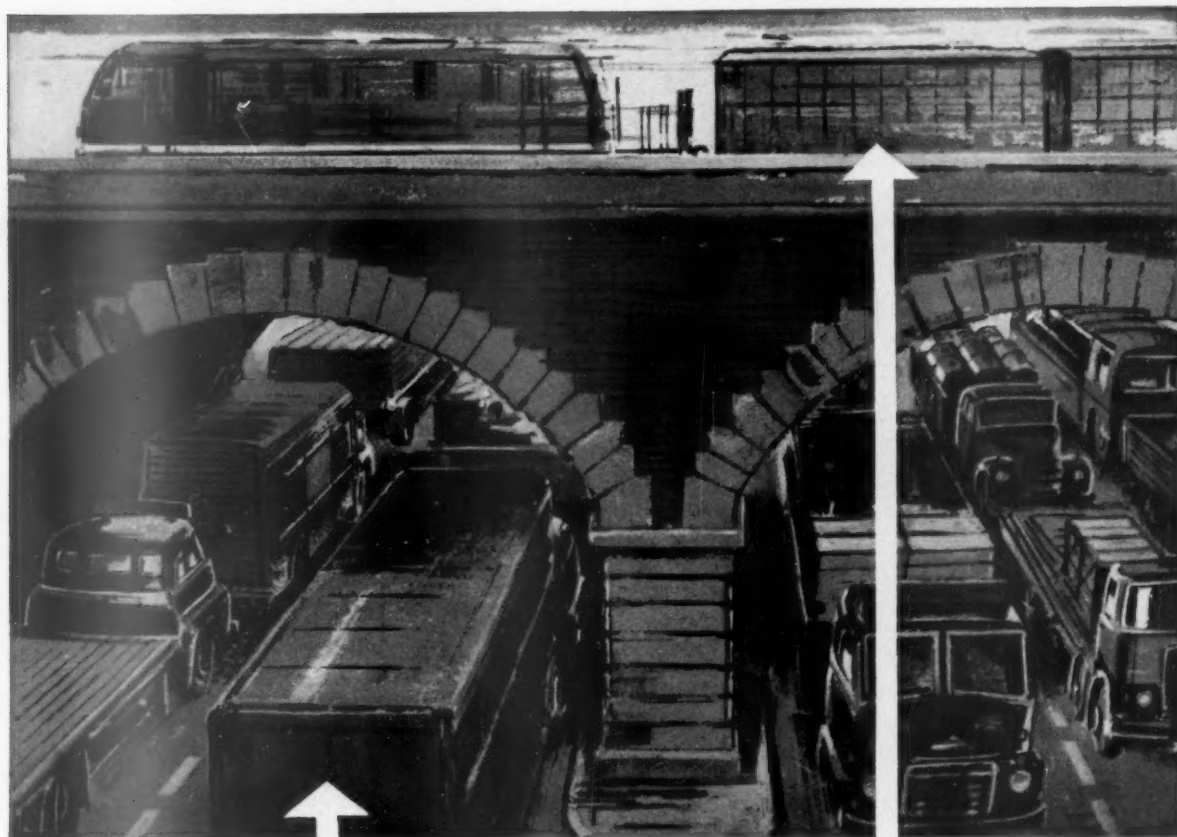
## HOT MILLER

**COVENTRY  
MACHINE TOOL WORKS LTD**  
**GRANTHAM RD. HALIFAX ENGLAND**

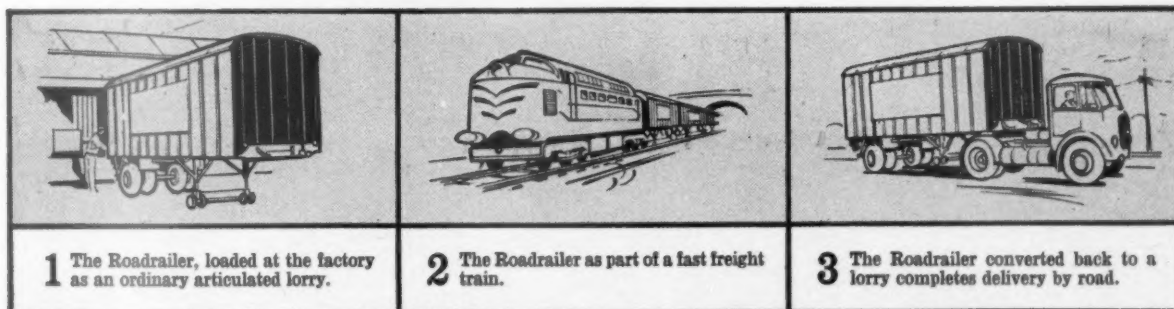
Phone: Halifax 3234/5 Grams: Covmac Halifax

### OVERSEAS AGENTS:—

AUSTRALIA: Gilbert Lodge & Co. Ltd., 386, Harris Street, Ultimo, Sydney N.S.W.  
CANADA: Williams & Wilson Ltd., 544, Inspector Street, Montreal. FRANCE: Societe Anonyme Alfred Herbert, 1 and 3, Rue du Delta, Paris (9e). HOLLAND: Esmeyer & Co., Oosterkade 24, Rotterdam, C.  
INDIA: Alfred Herbert (India) Ltd., 13/3, Strand Road, P.O.B. 681, Calcutta, 1. KENYA, UGANDA, TANGANYIKA & ZANZIBAR: Len Cooper Ltd. (P.O.B. 3796 Nairobi, Kenya). NEW ZEALAND: Gilbert Lodge & Co. Ltd., Head Office: 55, Station Road, P.O. Box 12-063 Penrose, Auckland, S.E.6. N.Z. also at Christchurch and Wellington. PAKISTAN: Guest, Keen & Nettlefolds in Pakistan Ltd., P.O.B. 819, Bank of India Buildings (3rd Floor), Bunder Road, Karachi. SOUTH AFRICA and RHODESIA: Hubert Davies & Co. Ltd., Hudaco House, 7, Rissik Street, Johannesburg. SPAIN: Gumuzio S.A. Gran Via 48, Apartado 920, Bilbao.



*This lorry... could be up there  
if only it were a Roadrailer!*



**1** The Roadrailer, loaded at the factory as an ordinary articulated lorry.

**2** The Roadrailer as part of a fast freight train.

**3** The Roadrailer converted back to a lorry completes delivery by road.

What have roads got that railways haven't? Door-to-door service on the same vehicle. They also have something else—traffic jams! These can make a potentially fast service into a frustratingly slow one.

The railway's fundamental equipment is the permanent way and on direct hauls it is the cheapest form of overland transport. To neglect its clear-cut advantages on long and medium trunk hauls does not make sense.

Now the Roadrailer gives the obvious

answer. It is a road vehicle that is transferred on to the permanent way in 150 seconds by letting down rail wheels. It can be adapted for any traffic including liquids, timber, cement. It coddles its loads with a suspension so smooth that a threepenny bit has been made to stand on edge at 65 m.p.h.

Feed railheads by road; trunk between railheads by rail. That makes sense. And now the Roadrailer can achieve it as a practical, profitable proposition.



**PRESSED STEEL CO. LTD.**

*Railway Division,  
Linwood Factory, Paisley, Scotland*

LONDON OFFICE: Railway Division, 47 Victoria St., London, S.W.1. HEAD OFFICE: Cowley, Oxford. BRUSSELS OFFICE: 2301/2307 Centre International Rogier, Passage International 6, Brussels 1, Belgium. Manufacturers of car bodies, Prestcold refrigeration equipment, all kinds of pressings and executive aircraft.

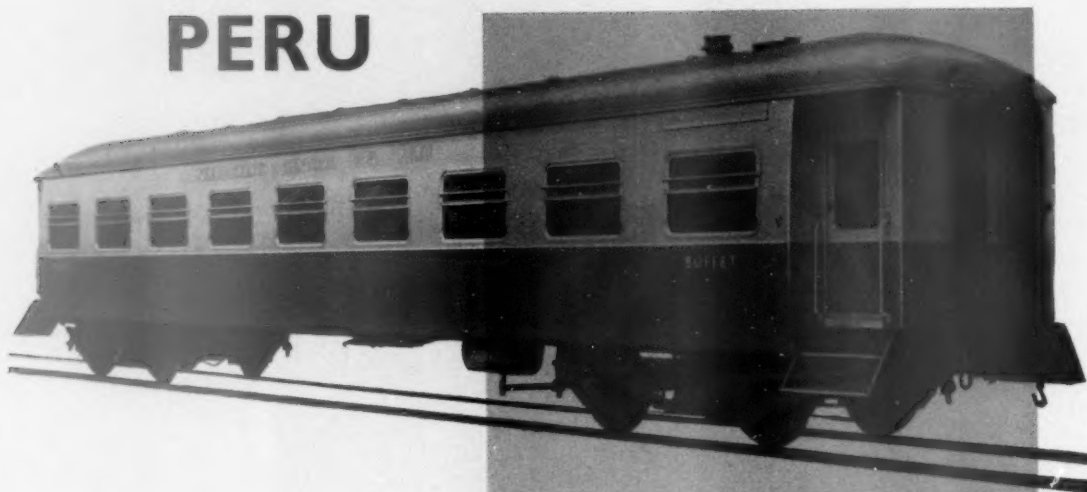
**150 SECONDS — YOU CAN HAVE THE BEST OF BOTH WORLDS**



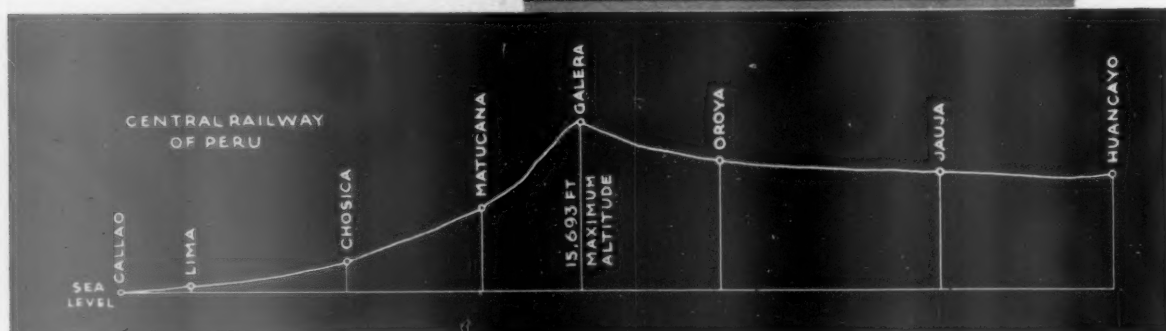
# LIGHTWEIGHT

*Coaches for*

## PERU



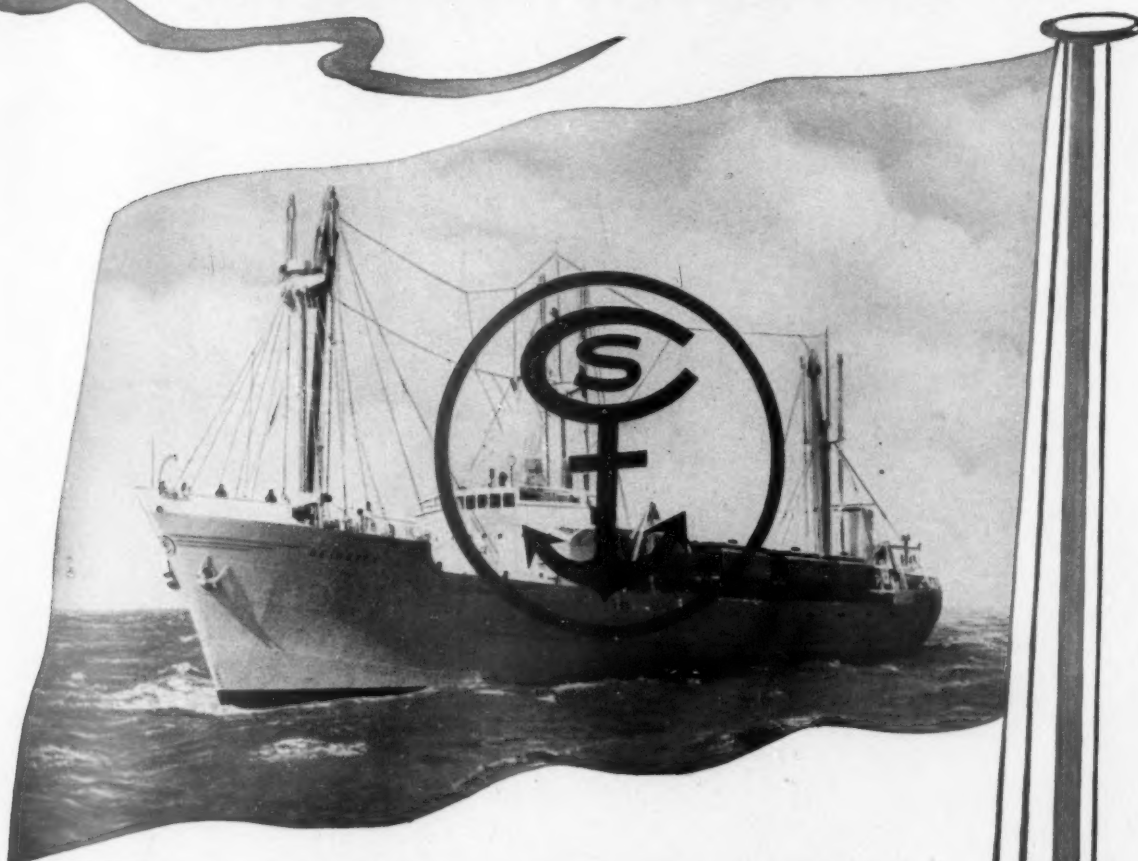
Recently delivered for service on the Central and Southern Railways of Peru are a number of special lightweight steel coaches of various types with tare weights of 18½ tons. Illustrated is a 1st class kitchen buffet car with seating accommodation for 26 passengers.



**CRAVENS LTD.** OF SHEFFIELD ENGLAND

ARCHITECTS FOR PASSENGER & FREIGHT STOCK

PIONEERS IN  
**HEAVY-LIFT TRANSPORTATION**



**BELSHIPS**

Over 30 years' specialisation in  
the transportation of Railway Rolling Stock  
World-wide service  
Lifts up to 200 tons

**BELSHIPS CO. LTD. SKIBS A/S • OSLO • NORWAY**

Managers: CHRISTEN SMITH SHIPPING CO., Haakon VII's Gate 1 • OSLO • NORWAY

London Office: BELSHIPS COMPANY LTD. • Creechurch House • Creechurch Lane • LONDON • E.C.3

# COLES QUALITY COSTS NO MORE



Photograph by kind permission of British Railways.

Quality usually implies extra cost. **Usually** . . . but not always. For, sometimes, by a rare combination of constructional know-how and shrewd factory organisation a product is turned out which not only stands pre-eminent in its field but also sells at a keenly competitive price.

Such a product is the Coles mobile crane. Acknowledged to be supreme in its class—more Coles are now in use than any other make—the Coles has built up a proud reputation for smooth diesel-electric efficiency. Fast-travelling, full slewing, it possesses a remarkable capacity for prolonged heavy duty under the most arduous conditions—and yet, we repeat, **Coles cost no more.**



Coles Cranes is a Registered Trade Mark

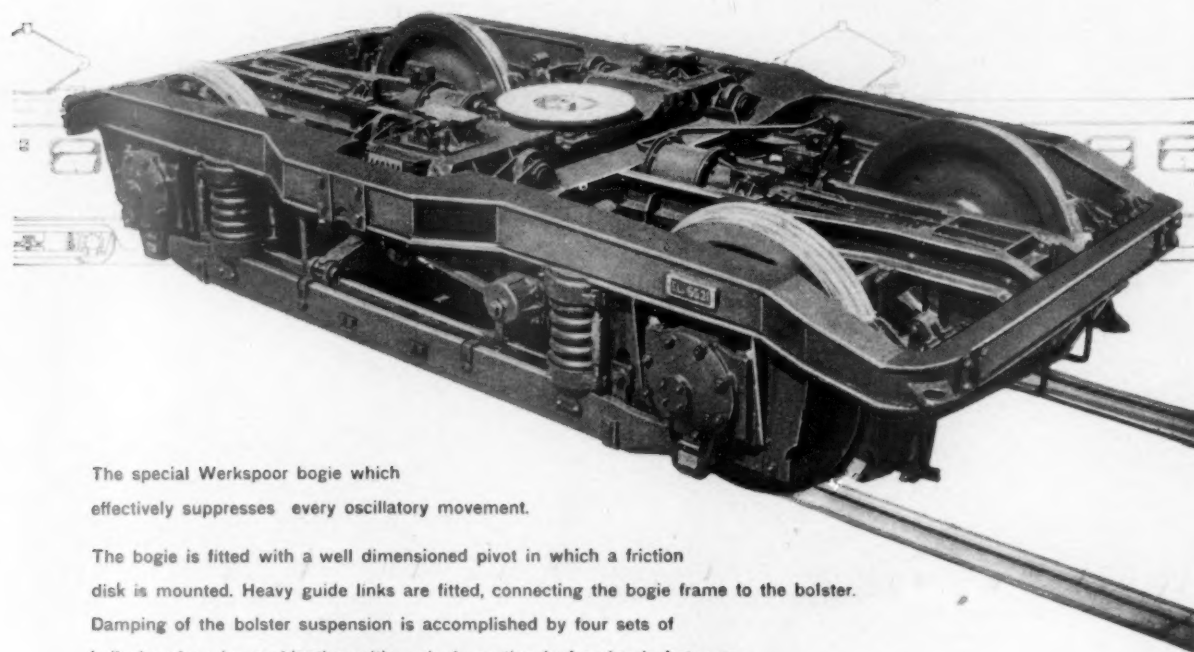
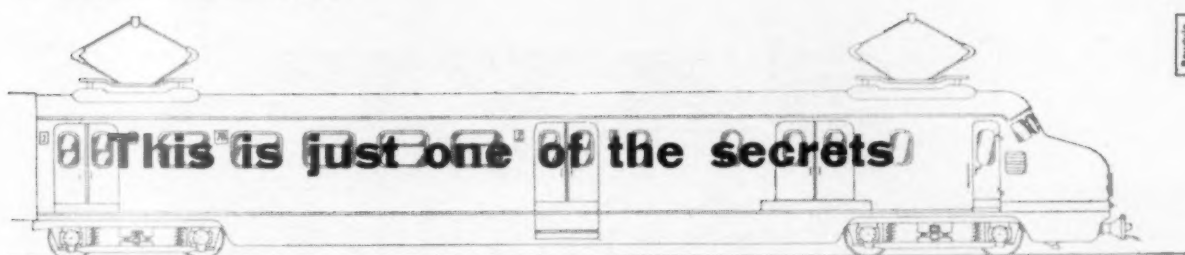
## STEELS ENGINEERING PRODUCTS LTD.,

STEEL HOUSE, EASTCOTE, MIDDLESEX.

SALES AND SERVICE: LONDON, BRISTOL, BIRMINGHAM, MANCHESTER,  
LEEDS, NEWCASTLE, GLASGOW.

A MEMBER OF THE STEEL GROUP OF CRANE AND EXCAVATOR MANUFACTURERS.





The special Werkspoor bogie which effectively suppresses every oscillatory movement.

The bogie is fitted with a well dimensioned pivot in which a friction disk is mounted. Heavy guide links are fitted, connecting the bogie frame to the bolster. Damping of the bolster suspension is accomplished by four sets of helical springs in combination with a single section leaf spring in between.

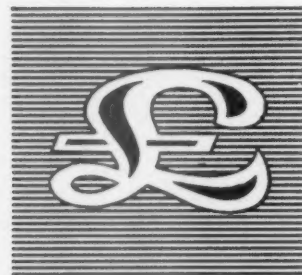
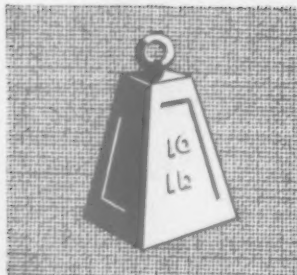
An additional factor contributing to the comfort of WERKSPOOR trains is the perfect sound insulation.

Another important feature of Werkspoor trains is the high safety factor, the all-welded steel structure of the cars proved to possess excellent protective qualities for passengers and train crew.

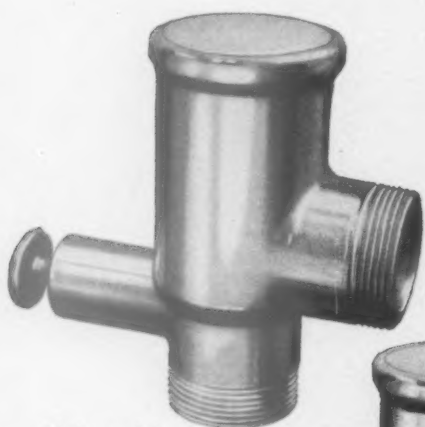
**WERKSPOOR N.V.**  
AMSTERDAM HOLLAND



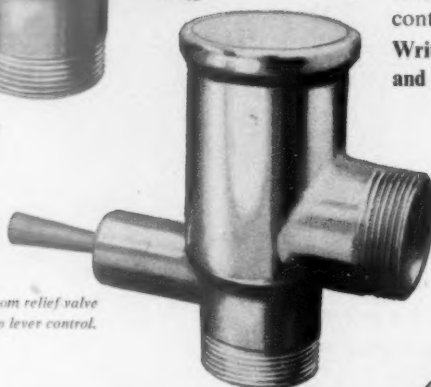
# SAVE



weight · water · space · cost!



*Mushroom relief valve with push button control.*



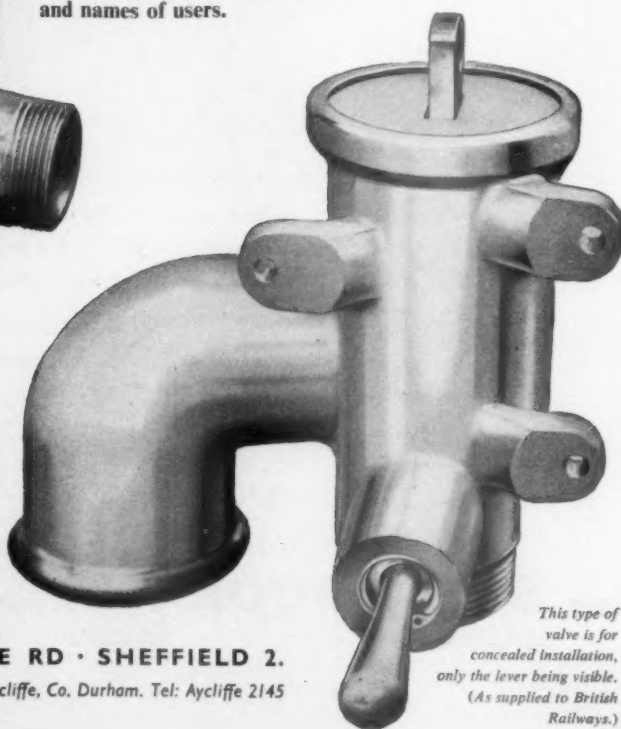
*Mushroom relief valve with trip lever control.*

Neat, light and space-saving, Wild Lavatory Flushing Valves operate at maximum efficiency with the minimum use of water. The prescribed amount of water for flushing—it can vary from  $\frac{1}{2}$  to 2 gallons—is strictly regulated and the valves will function satisfactorily down to a 3 ft. head of water.

The trouble-free operation of these valves is determined by basically simple design, ensuring positive re-seating and instantaneous action. This same simplicity eliminates the need for small bye-passes so there is no risk of clogging.

Available with trip lever or push button control as illustrated.

**Write for explanatory literature and names of users.**



*This type of valve is for concealed installation, only the lever being visible. (As supplied to British Railways.)*

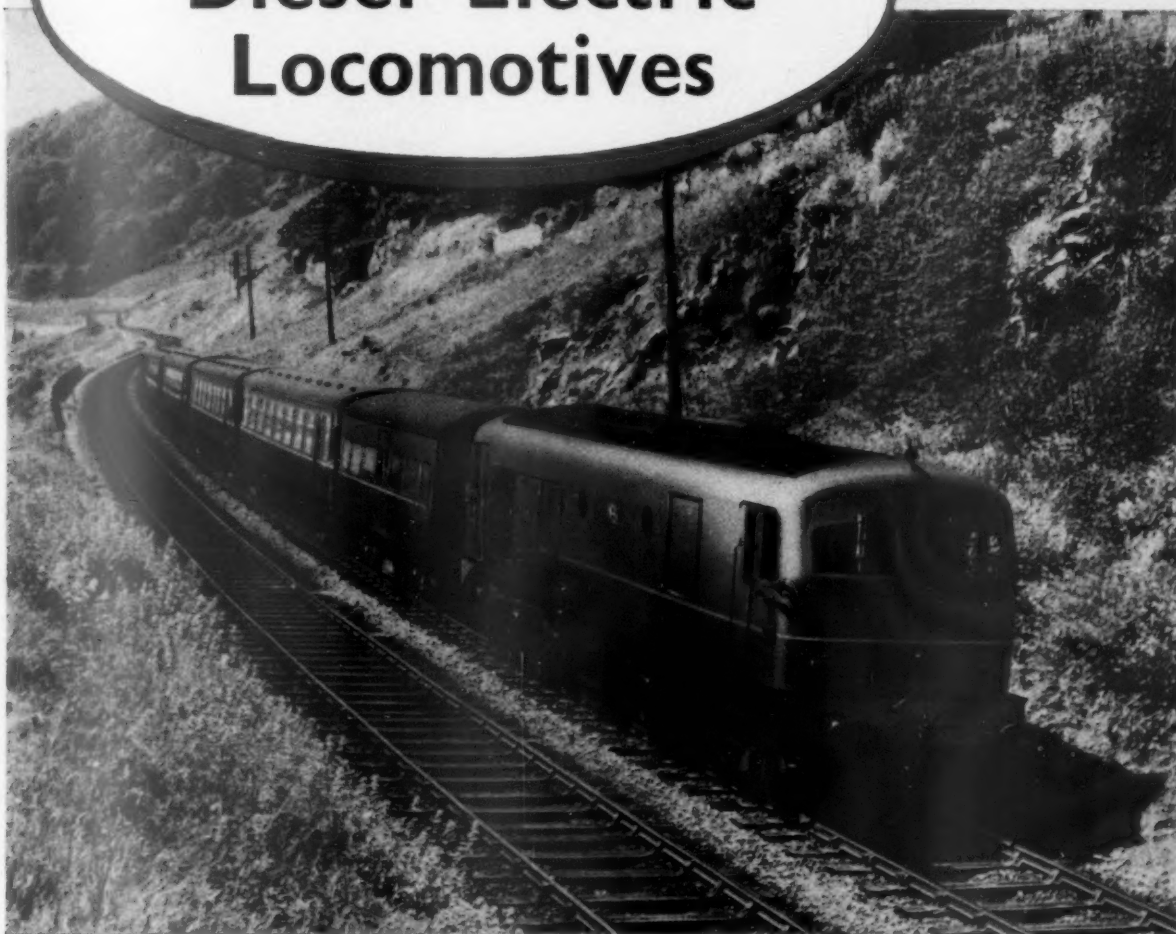
**FLUSHING VALVES**  
by

**WILD**

**A. G. WILD & CO LTD · CHARLOTTE RD · SHEFFIELD 2.**

and at Aycliffe Trading Estate, Aycliffe, Co. Durham. Tel: Aycliffe 2145

# AEI Diesel Electric Locomotives



One of 94 complete diesel-electric locomotives supplied to Coras Iompair Eireann (Ireland's Transport Company), by AEI, who have supplied diesel-electric and straight electric locomotives throughout the world.

*All enquiries should be addressed to the local AEI Office or direct to AEI Traction Division, Trafford Park, Manchester 17.*

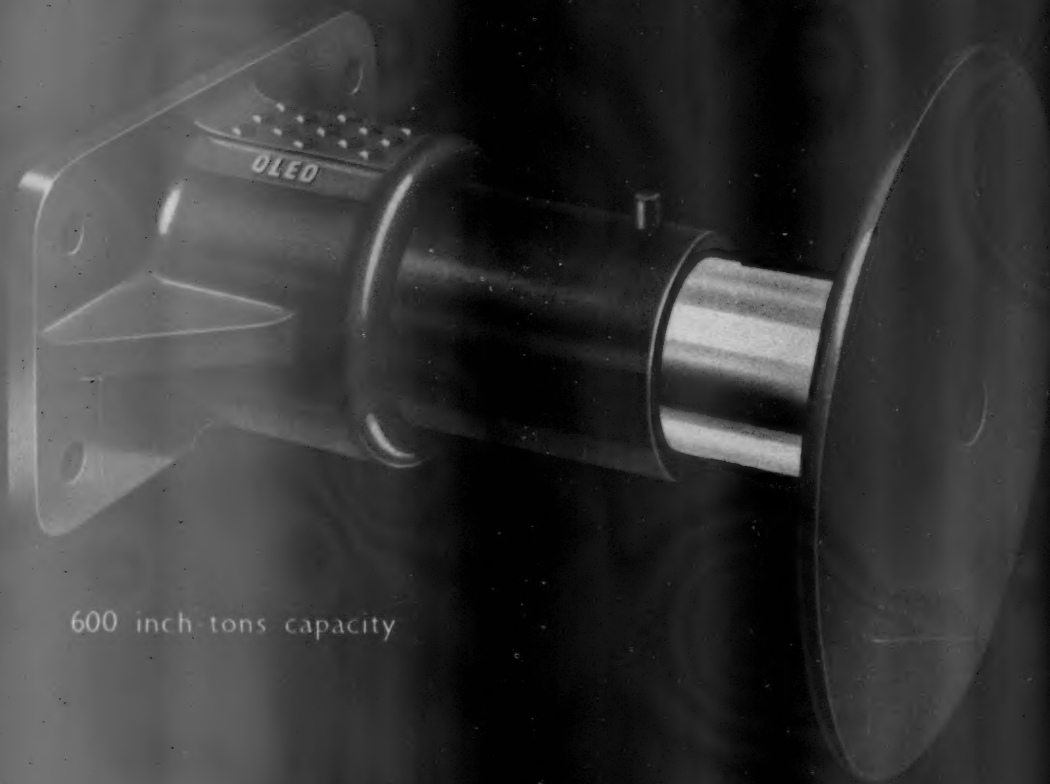


**Associated Electrical Industries Ltd.**  
**Traction Division**  
**MANCHESTER AND LONDON**

KT/006



*Dependable Hydraulic Buffers*  
*Pioneered by **Oleo***



600 inch tons capacity

***Oleo Pneumatics Ltd***

KENILWORTH • ENGLAND



The introduction of 'OLEO' hydraulic buffers, in combination with improved wagons, permanent way, and modern marshalling yards, not only contributes to a modernization plan which will eventually make British Railways one of the most efficient systems in the world, but also ensures that goods can now be economically carried by them at express speeds, on schedule, without damage.

We are proud to be a party in this

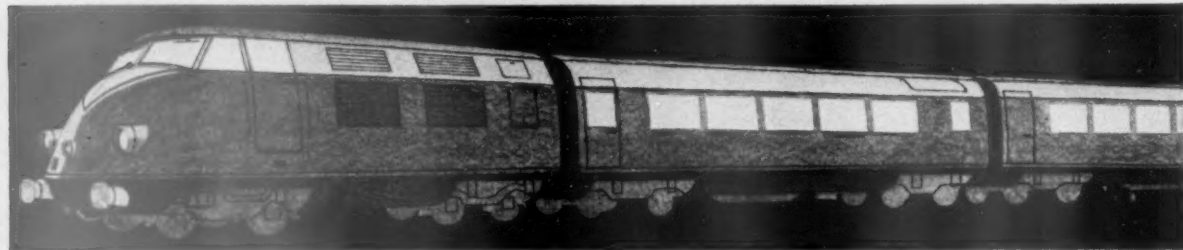
modernization which lends itself to the improvement of our railways, relieving congestion on the roads, and contributing to the benefit of all.

The safety with which your goods are carried by these streamlined services is assured, because 'OLEO' pneumatic buffers can cushion shocks thirty times greater than is possible with conventional buffers.

'OLEO' hydraulic buffers are another British achievement.



Now...**TRIPLEX** Toughened Glass for tomorrow's rolling stock



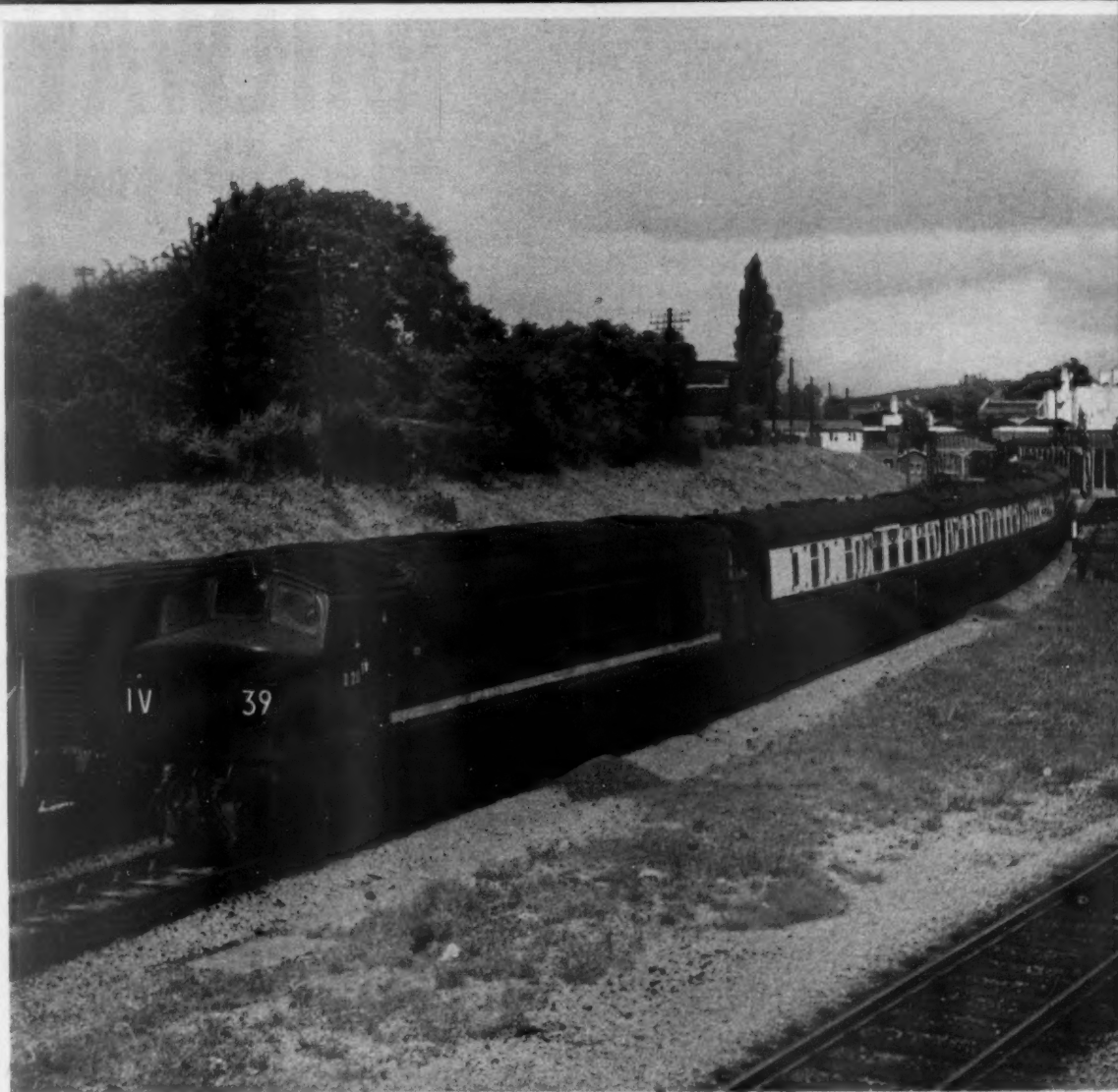
For many years now, Triplex glass has been a familiar and reassuring feature to millions of motorists. Now Triplex Toughened Glass joins Triplex Laminated Glass in the industrial field. It is available now to the designers and manufacturers of railway carriages and other rolling stock. If you have any technical problems or special requirements concerning safety glass, write to us.

**TRIPLEX** 

THE TRIPLEX SAFETY GLASS COMPANY LTD. AT HYTHE ROAD, WILLESDEN, LONDON, N.W.10, KINGS NORTON, BIRMINGHAM, OR ECCLESTON, ST. HELEN'S, LANC.



# SULZER



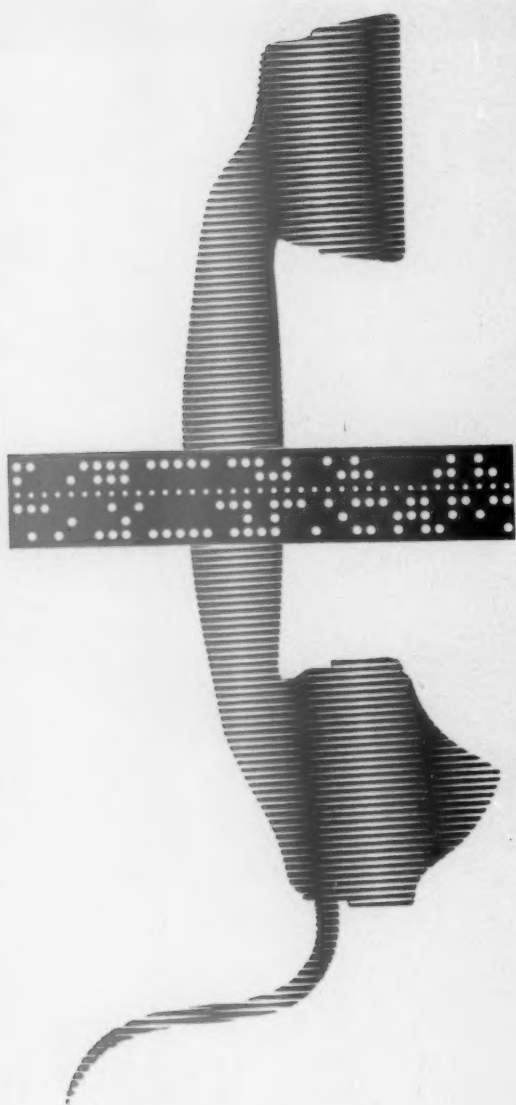
**6**

## **WESTERN REGION**

### **BRITISH RAILWAYS MODERNISATION**

Some of these Type '4' Locomotives are being supplied to the Western Region. The modernisation plan so far calls for 603 Sulzer Rail Traction Engines totalling over one million h.p.

**SULZER BROS. (LONDON) LTD.  
31 BEDFORD SQUARE, LONDON, W.C.1.**



# FIRST RAILWAY MICROWAVE RADIO TELEPHONE SYSTEM IN BRITAIN

**300 Channels  
between  
Newcastle and York**

British Railways first microwave multichannel system from Newcastle to York via Darlington will have a 300 telephone channel capacity. The system allows for channels to be dropped off at intermediate points and can accommodate high speed data transmission.

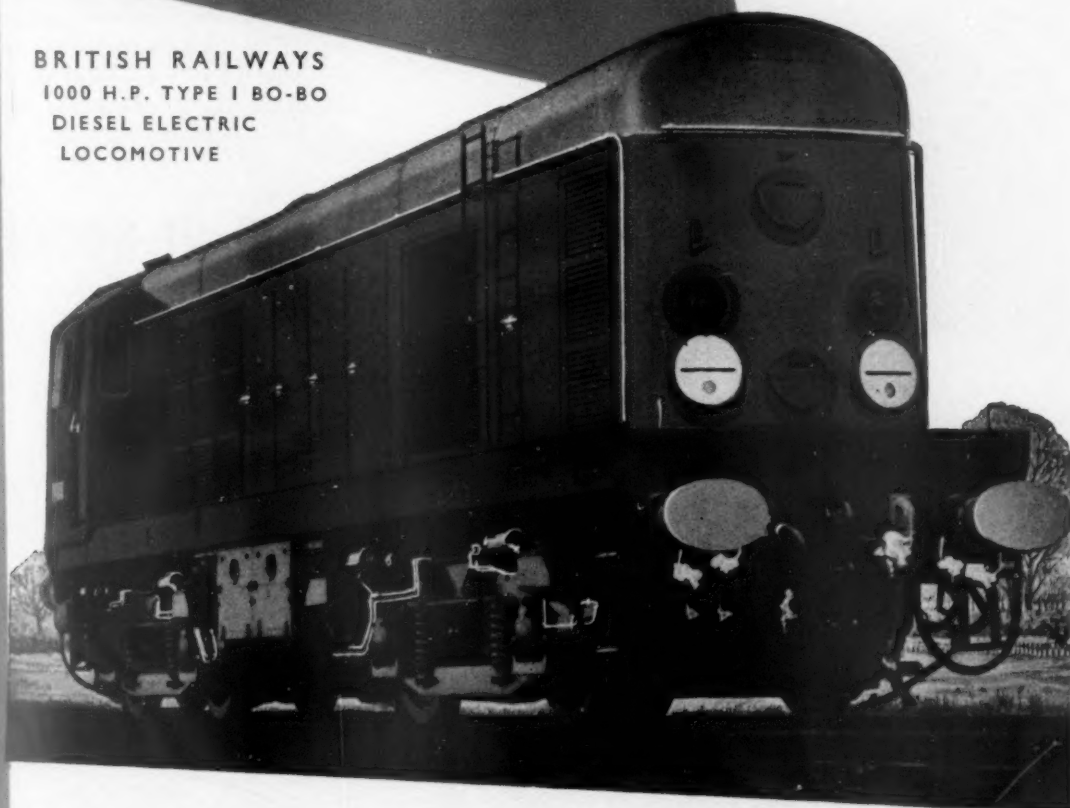
## MARCONI

COMPLETE COMMUNICATION SYSTEMS  
SURVEYED • PLANNED • INSTALLED • MAINTAINED

COMMUNICATIONS DIVISION, MARCONI'S WIRELESS TELEGRAPH COMPANY LIMITED, CHELMSFORD ESSEX, ENGLAND.

H 3

**BRITISH RAILWAYS  
1000 H.P. TYPE 1 BO-BO  
DIESEL ELECTRIC  
LOCOMOTIVE**



50 OF THESE LOCOMOTIVES ARE NOW IN SERVICE ON BRITISH RAILWAYS (AND A FURTHER 78 BUILDING). CONSTRUCTED BY THE ENGLISH ELECTRIC CO. LTD., VULCAN FOUNDRY LTD., AND MESSRS. ROBERT STEPHENSON & HAWTHORNS LTD., FOR MIXED TRAFFIC SERVICE. THEY ARE EQUIPPED WITH—

**METCALFE-OERLIKON**  
PATENTED  
**AIR AND VACUUM BRAKE EQUIPMENT**

*Manufactured at the Romiley and Dukinfield Works of*

**DAVIES & METCALFE LTD**  
ENGINEERS, ROMILEY • Tel.: WOO 2626 (3 LINES)

MAKERS OF MODERN AIR BRAKE EQUIPMENT AND ENGINEERS  
TO THE LOCOMOTIVE INDUSTRY SINCE 1870





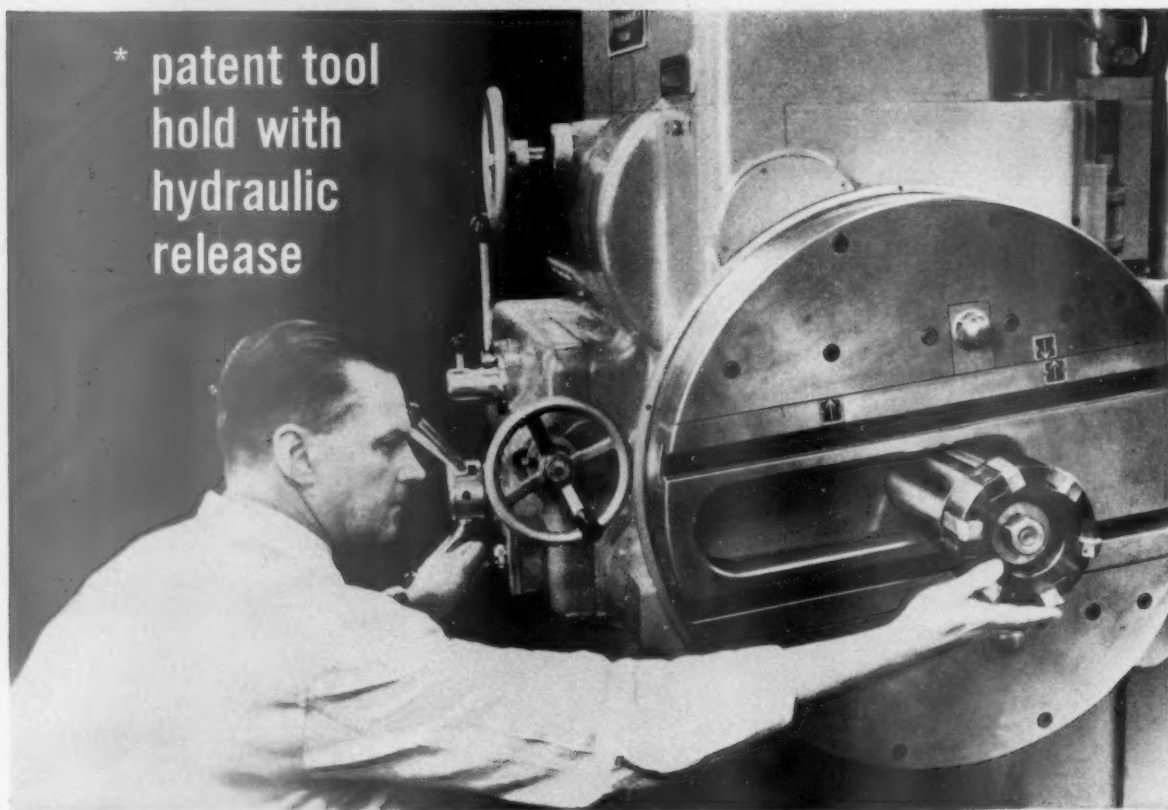
This new system is perfection in tool holding. The tool is carried in a non-stick taper in the spindle nose and secured by a draw bar via a bayonet type attachment. The quick lock and hydraulic release are operated from a switch.

## tool changing in seconds!

- \* Guarantees speedy, accurate and safe tool changing.
- \* Eliminates damage and wear.
- \* Simple to operate.
- \* Reliable in performance.
- \* Available on Series 45, 72 and all Kearns Patent Horizontal Boring Machines.

# KEARNS

\* patent tool hold with hydraulic release



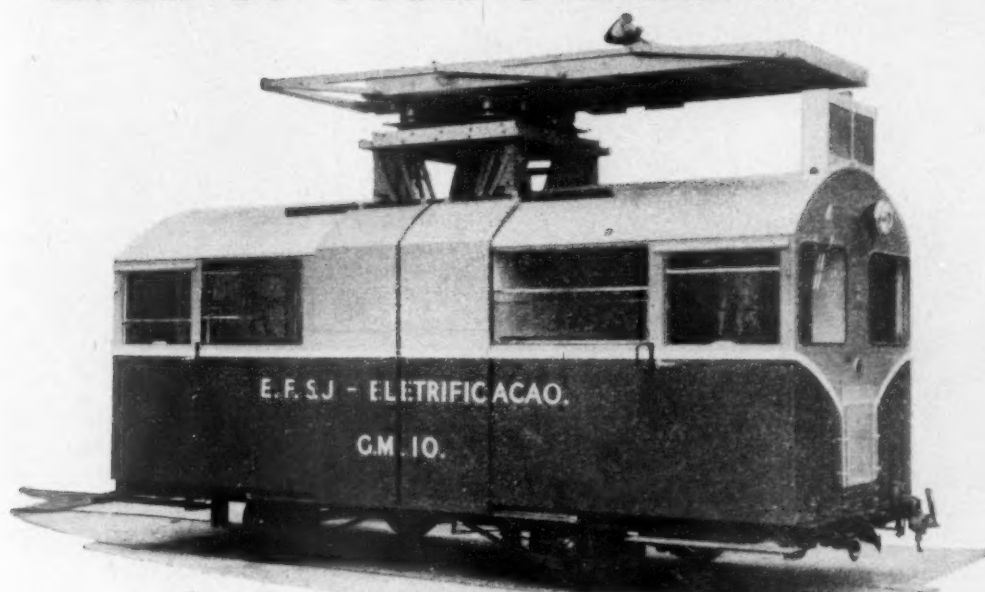
\* Another KEARNS development for improved production efficiency



H. W. KEARNS & CO. LIMITED, BROADHEATH near MANCHESTER

# WICKHAM OF WARE

## LOOK TO YOUR OVERHEADS



Wickham manufacture a wide range of maintenance cars, extending from forty seater double-end control heavy gang cars to single-seater light inspection trolleys, for all duties.

Illustrated is a very useful type for tunnel, bridge and overhead electric maintenance. The insulated elevating tower is hydraulically operated by an engine-driven pump, the top platform being fully rotatable. Double-end control is provided with four speeds in either direction, the power unit being a petrol engine, or, if preferred, a diesel. Totally enclosed compartments at each end provide ample storage and working space for the crew. Platform heights can be arranged to suit requirements.

### WICKHAM PRODUCTS:

DIESEL RAILCARS, LIGHTWEIGHT RAILBUSES,  
INSPECTION CARS, TOWER TROLLEYS, GANG  
CARS, PUMP TROLLEYS, TRACK EQUIPMENT.

**D. WICKHAM & COMPANY LIMITED**  
WARE, HERTFORDSHIRE. ENGLAND

Telephones: WARE 394-6

Cables: Wickham Ware



## *Maybach diesels power the new Hymek locomotives*

Bristol Siddeley Maybach\* diesel engines have been chosen for the new Hymek diesel-hydraulic locomotives. 95 of these Type 3 locomotives have been ordered for main-line use on British Railways Western Region. This now brings the total order placed with Bristol Siddeley for British Railways to 286.

### **DESIGNED FOR ECONOMIC OPERATION**

Bristol Siddeley Maybach rail traction diesel engines range from 384 to 2,000 hp and embody design features which produce more efficient operation in terms of lower wear, greater reliability and easier servicing.

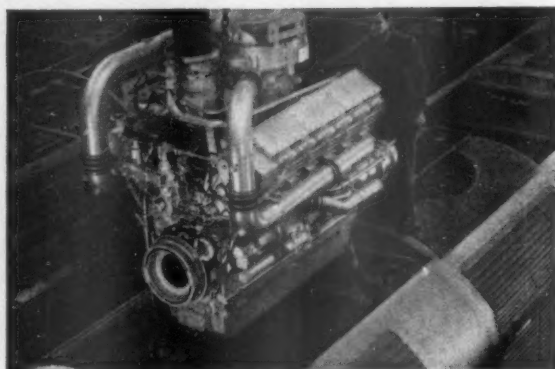
The immensely strong, roller bearing disc-webbed crankshaft, for example, is extremely rigid in its tunnel housing.



**Disc-webbed, roller  
bearing crankshaft  
and tunnel housing**

This results in very low main and big-end bearing wear. The pressure-oil cooling of the pistons gives effective heat dissipation which reduces liner and gas ring wear to a minimum.

Since the majority of components are identical in all models, spares stocks can be cut and servicing is simplified through interchangeability.



*Maybach diesel engine being installed in D800 Class at Swindon.*

### **WORLD-WIDE SERVICE**

Maybach engines are in service all over the world, and have built for themselves an unsurpassed reputation as the most efficient diesel engines of today. This reputation, backed by the efficient Bristol Siddeley after-sales and spares service, offers the most satisfactory solution to all rail traction requirements.

For further information, please write to: Power Sales Manager, Power Division, Bristol Siddeley Engines Limited, PO Box 17, Coventry, England. Cables: Brisidair, Coventry.

*\*Manufactured in the UK under exclusive licence from Maybach-Motorenbau GmbH.*

### **BRISTOL SIDDELEY ENGINES LIMITED**

TURBOJETS - TURBOFANS - TURBOPROPS - RAMJETS - ROCKET ENGINES  
MARINE AND INDUSTRIAL GAS TURBINES - MARINE, RAIL AND INDUSTRIAL  
DIESEL ENGINES - PISTON ENGINES - PRECISION ENGINEERING PRODUCTS

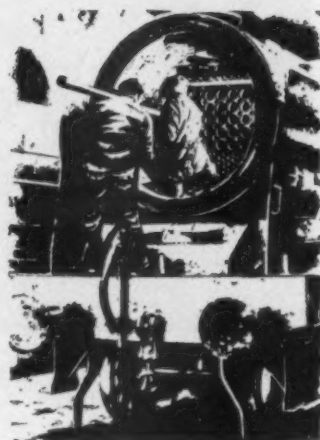


# 'ALFLOC' ON THE FOOTPLATE



Like most of us, the 'Alfloc' man probably once wanted to be an engine-driver. And, though his one-time ambition may have eluded him, he plays a vital part in helping the engine-driver. For 30 years, the 'Alfloc' Water Treatment Service of Imperial Chemical Industries Ltd. has been building up an unparalleled volume of skill and experience in handling problems of railway water treatment. Today, the 'Alfloc' man is helping to keep engines—both steam and diesel—out of the time-consuming sheds, helping to avoid exasperating breakdowns, helping to eliminate all problems connected with water usage.

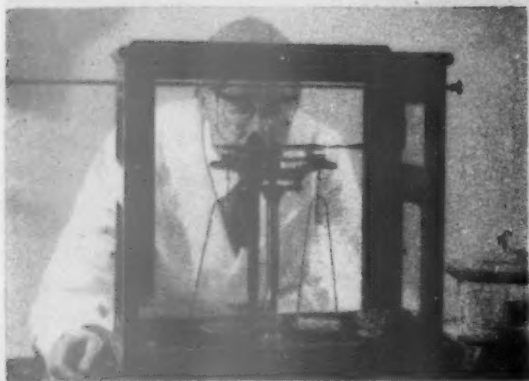
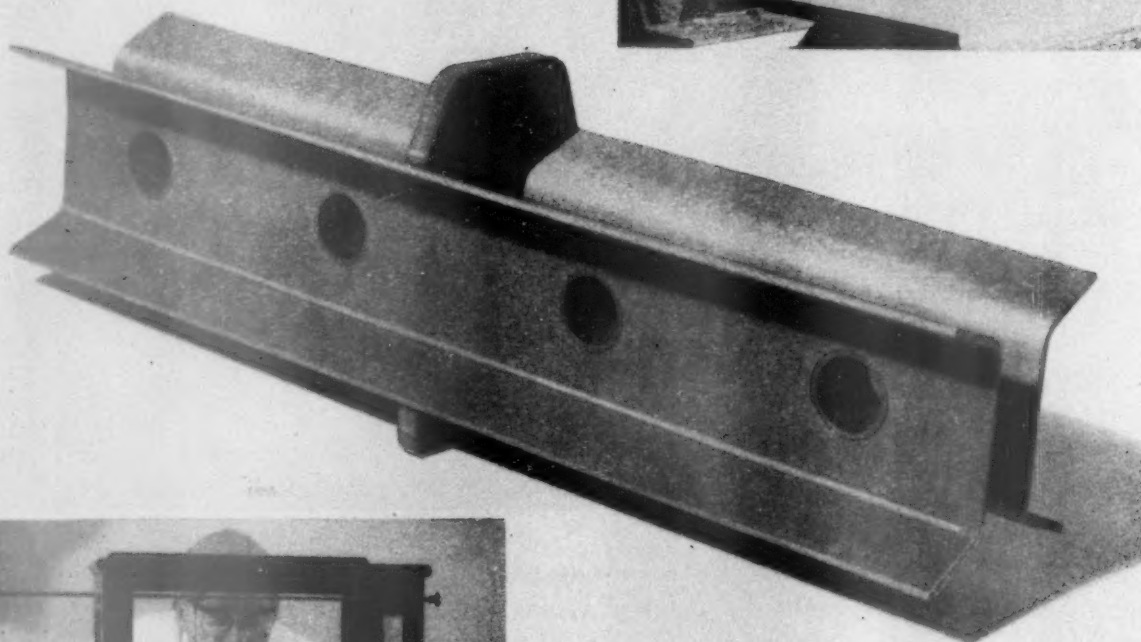
Maybe the 'Alfloc' man can't drive the engine—but he brings the scientific and technological resources of I.C.I. to bear on all water problems that arise in keeping the engines running.



IMPERIAL CHEMICAL INDUSTRIES LIMITED  
'ALFLOC' WATER TREATMENT SERVICE,  
4 CROMWELL PLACE, LONDON, S.W.7.

# ALL ALONG THE LINE—

## IT'S Castle FIBRE



### TRACK INSULATION

Specially made to British  
Standards and Tested for  
Quality Throughout.



## Vulcanised Fibre Ltd

BROADFORD MILLS GUILDFORD ENGLAND

PHONE: GUILDFORD 5214-7

GRAMS: VULCANISED, GUILDFORD

TELEX: 8529

# Standardize

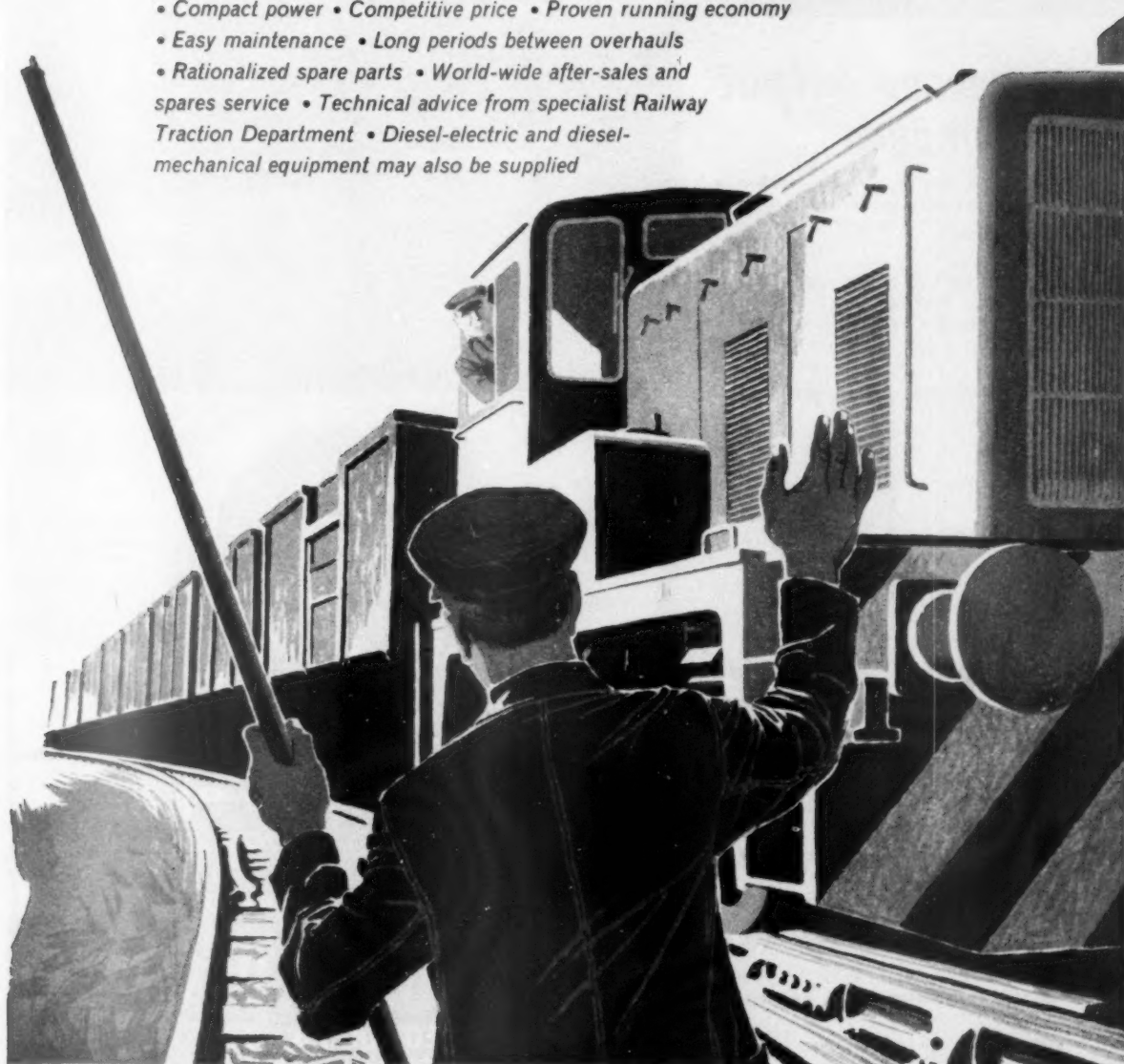
ON COMPLETE

## ROLLS-ROYCE

### DIESEL-HYDRAULIC EQUIPMENT

FOR SHUNTING, FREIGHT AND MIXED TRAFFIC LOCOMOTIVES

- Compact power • Competitive price • Proven running economy
- Easy maintenance • Long periods between overhauls
- Rationalized spare parts • World-wide after-sales and spares service • Technical advice from specialist Railway Traction Department • Diesel-electric and diesel-mechanical equipment may also be supplied



Builders of locomotives and railcars, and operators who are considering redesigning and re-engining existing equipment, are invited to write to:  
ROLLS-ROYCE LIMITED · RAILWAY TRACTION DEPARTMENT · SHREWSBURY (Tel: 52262) ENGLAND

ROLLS-ROYCE—AERO ENGINES · MOTOR CARS · DIESEL AND PETROL ENGINES · ROCKET MOTORS · NUCLEAR PROPULSION



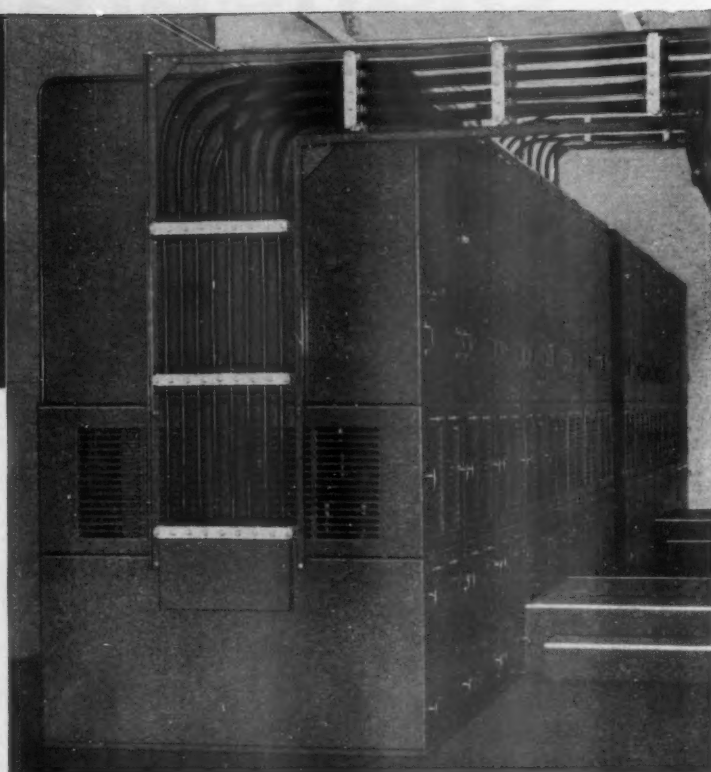
# HEWITTIC

## Cooled-Cathode RECTIFIERS

### *Increased output -less space*

The Hewittic cooled-cathode rectifier is essentially compact and provides a very high capacity within a given floor area.

Right: Two Hewittic cooled-cathode rectifiers forming a 5000 kW bank in the Dover Substation British Railways, Southern Region:



CONVENTIONAL



COOLED-CATHODE

- Smaller size (see comparison between conventional and cooled-cathode bulbs of same capacity above).
- Improved efficiency at lower voltages.
- Dependability of bulb maintained.
- Ease of installation and maintenance.

Send for publication R192/2



750 kW  
3000 volt  
Hewittic  
cooled-cathode  
rectifier bulb

## HACKBRIDGE AND HEWITTIC

### ELECTRIC CO. LTD.

WALTON-ON-THAMES - SURREY - ENGLAND

Telephone: Walton-on-Thames 28833 (8 lines) Telegrams & Cables: "Electric, Walton-on-Thames"

# **Bulk production of Vacuum Brake Cylinders for British Railways modernisation programme**



To meet the demand for fully fitted freight trains giving higher overall speeds



*\* The 'E.I.' Brake cylinder incorporates many special features and was designed jointly by the technical staffs of Gresham and Craven Ltd. and British Railways.*

Illustration shows a batch of  
**18" CLASS E.I.  
Brake Cylinders**  
awaiting despatch at  
our Worsley Brake Works  
near Manchester

## **GRESHAM & CRAVEN LIMITED**

Designers and Manufacturers of complete  
Vacuum Brake equipments for Locomotives,  
Railcars and all Rolling stock.

LONDON OFFICE & SALES: 15 WHITEHALL, SW1 TEL.: TRAFALGAR 6611-2 CABLES: LOCO. BRAKE. LONDON  
HEAD OFFICE & WORKS: BRAKE DIVISION, P.O. BOX NO. 4, NORFOLK STREET, WORSLEY ROAD NORTH, WALKDEN, MANCHESTER  
TEL.: FAO 2041 (14 LINES). GRAMS: BRAKE, PHONE, WALKDEN, MANCHESTER.

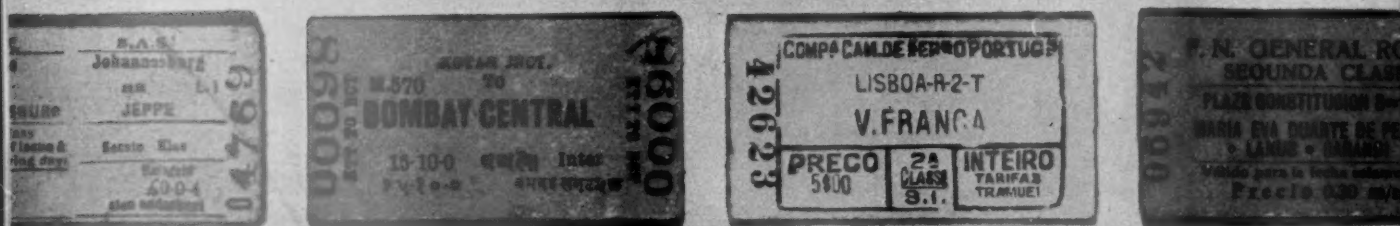


# THIS TRAIN IS GOING PLACES

Johannesburg ... Bombay ... Lisbon ...

Sarandi ... Amsterdam ... Nanu-Oya ...

It could be any of these and more,  
for G.E.C. can supply traction  
equipment to *any part of the world.*

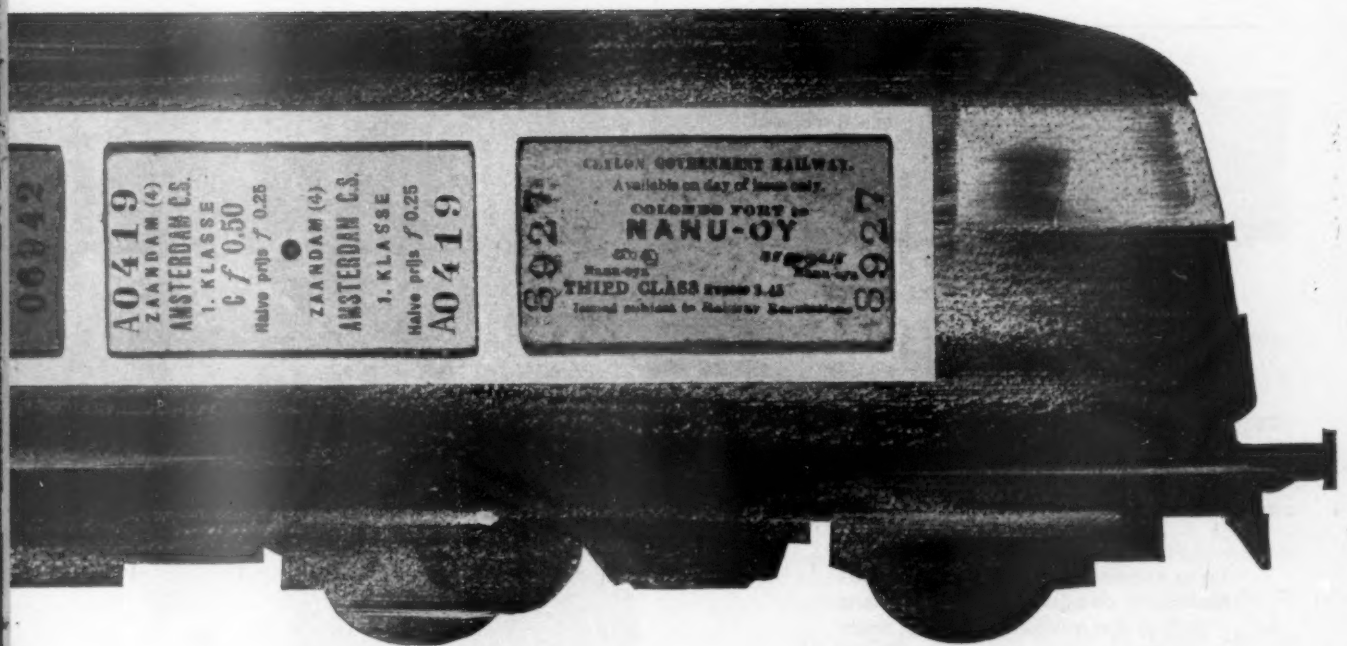


Complete electrification  
Locomotives and trains—electric  
and diesel-electric  
Cables, track structures  
and overhead lines  
Power stations and sub-stations  
Signalling and communications  
Remote supervisory control  
Lighting and heating  
Kitchen car equipment

## RELY ON THE

THE GENERAL ELECTRIC COMPANY LIMITED OF ENGLAND  
TRACTION DIVISION BIRMINGHAM 6





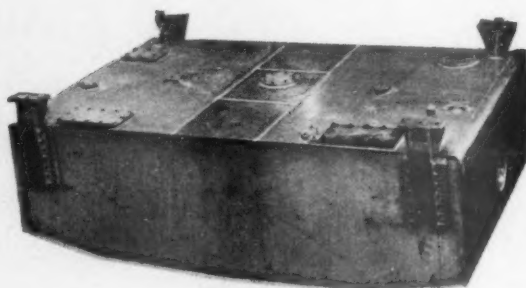
EXPERIENCE OF

**G.E.C.**

## Weight on your mind?

---

If you've a weight-saving or heat-transfer problem on your mind, bring it to Marstons.



---

Marstons offer a comprehensive design and production service for locomotive components — from complete cab assemblies in light alloy and laminated plastic to element-type radiators in light alloy or copper-brass.

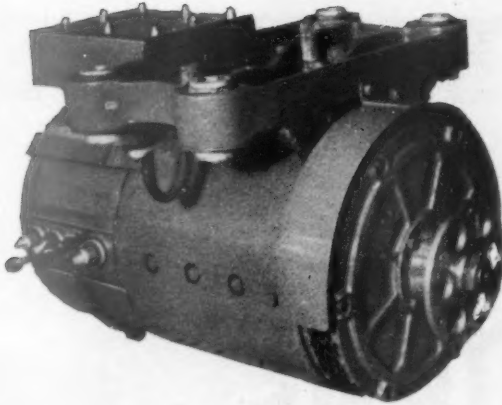


---

Long experience in this field enables Marstons' designers and technicians to find the quickest and best route to the solution of your problems.



**Marston Excelsior Ltd., Fordhouses, Wolverhampton**  
a subsidiary of Imperial Chemical Industries Ltd.



A traction motor has to withstand a combination of rough treatment—both electrical and mechanical—that no ordinary motor could be expected to endure. And it has to pack a lot more power into smaller dimensions. To the designer this is not just one problem but a collection of problems, to which solutions are found not all at once but one at a time, many of them perforce on the basis of experience accumulated over the years.

## This thing called know-how



Take this field coil from a C.P. traction motor. It looks more like a forging than a coil—and in a sense it is; a hard, precisely dimensioned, pressed square frame forming a coherent mass in which the conductors are buried and securely held; proof against dirt, water and vibration. This is the kind of know-how that comes of 80 years in the business.

# Crompton Parkinson

LIMITED



Makers of Electric Motors of all kinds A.C. and D.C. Generators, Cables, Switchgear, B.E.T. Transformers, Instruments, Lamps, Lighting Equipment, Batteries, Stud Welding Equipment, Traction Equipment, Ceiling Fans.

TRACTION DEPARTMENT, CHELMSFORD, ESSEX Tel: Chelmsford 3161 'Grams & Cables: Crompark, Chelmsford TE611



# Rail Transport



From the Tandem range of White Metals, the designer can select alloys which have been developed for specific duties, made from the purest ingredient metals and alloyed in the works of the largest bearing metal organisation in Europe.

★ DEPENDABLE BEARINGS ARE

LINED WITH TANDEM WHITE METALS

THE

## EYRE

## SMELTING CO. LTD

THE MAKERS OF ARIEL AND ESCO PHOSPHOR BRONZE RODS

TANDEM WORKS, MERTON ABBEY, LONDON, S.W.19 Tel: Mitcham 2031

# THE ONLY LOCKNUT

## SPECIFICALLY DESIGNED FOR RAILWAY USE—

BRITISH RAILWAYS find the Evertite Locknut the best answer so far to the problem of ensuring maximum safety and minimum maintenance where high density of traffic and high speeds put an increasingly heavy strain on Heel and Crossing Bolt assemblies.

*Up main line at Reading General*



OVERSEAS RAILWAYS also use the Evertite Locknut in Heel and Crossing assemblies and the Evertite is proving to be the means of reducing maintenance over vast stretches of permanent way and ensuring maximum safety.

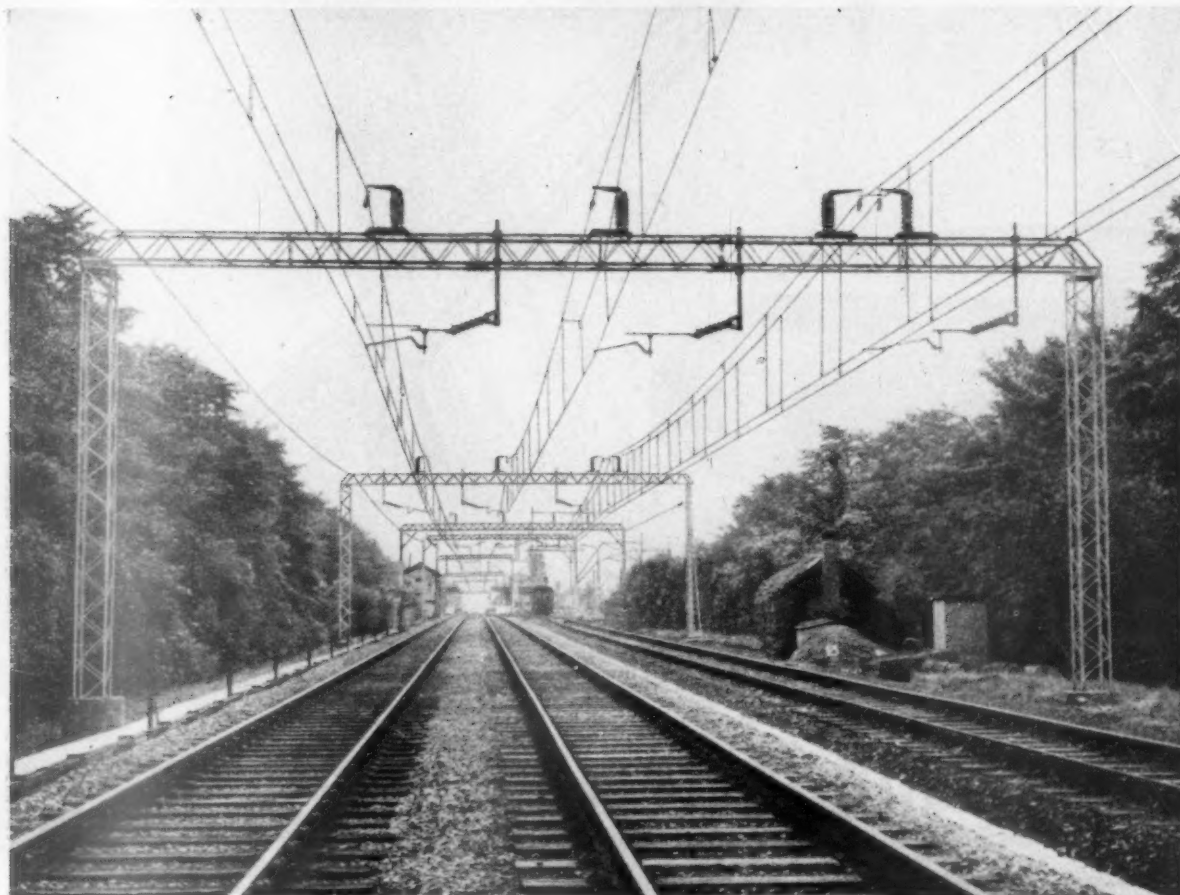
*A crossing at Park Station, Johannesburg*



**"WRITE FOR BROCHURE"**  
**NUTS & BOLTS**  
**(DARLASTON) LTD.**

FOSTER STREET • DARLASTON  
STAFFS • ENGLAND

## Railway Electrification



*Published by courtesy of the main contractors  
Messrs. British Insulated Callenders Construction Company Limited.*

### SCHEMES SUPPLIED:

British Railways (conductor rail, overhead AC & DC)  
London Passenger Transport Board (conductor rail)  
Argentine Railways (conductor rail)  
Brazilian Railways (overhead)  
Bolivian & Chilean Railways (conductor rail)  
Indian Railways (overhead)  
New South Wales Railways (overhead)  
Polish State Railways (overhead)  
South African Railways (overhead)  
Victorian State Railways (overhead)

Bullers Limited have supplied insulators and metal fittings for railway electrification schemes (Conductor Rail and Overhead Systems) during the past 50 years.

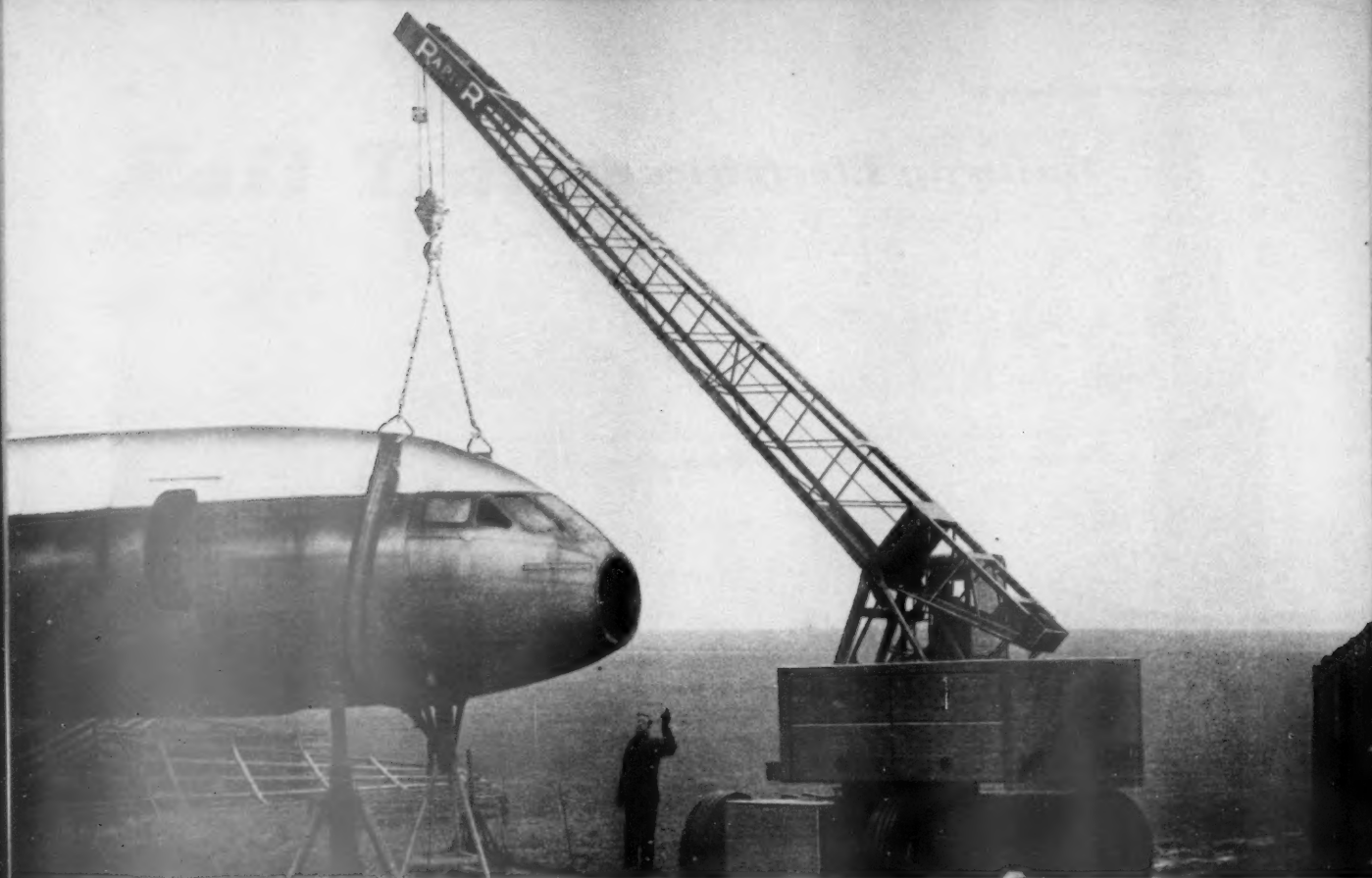
The above illustration of the British Railways 25 kV. A.C. system is one of the latest schemes on which Bullers insulators and fittings have been used.



**BULLERS LIMITED** MILTON STOKES-ON-TRENT • STAFFS

Phone: Stoke-on-Trent 54321 (5 lines). Grams & Cables: Bullers, Stoke-on-Trent

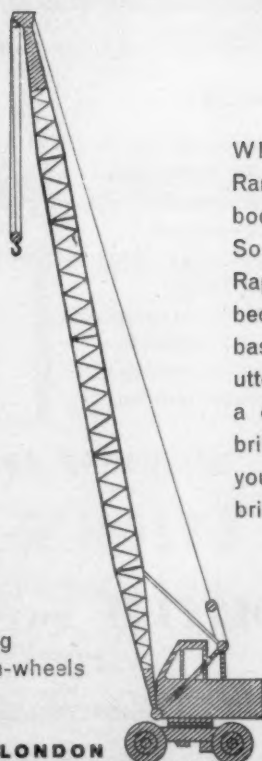
.. Ironworks: TIPTON, STAFFS, Phone: Tipton 1691. London Office: 6 LAURENCE POUNTNEY HILL, E.C.4 Phone: MANsion House 9971



The brilliant new

**RAPIER**

- Loads up to 6 tons free-on-wheels
- Cantilever jibs up to 40 feet
- Strut jibs up to 60 feet
- Two-motor travel drive giving electrical differential and full traction on both sides under all conditions
- High manoeuvrability—turning circle 21' 0"
- Separate or simultaneous operation of all motions with full control from creeping to full speeds
- Diesel-electric drive
- Exceptionally smooth high speed slewing on cross roll bearing
- Safe, controlled power lowering under full load for both hoist and derrick
- Small tail radius—only 6' 3"
- Centrally mounted superstructure giving best all round outreaches and weight distribution on the ground
- Great stability and full mobility when handling maximum loads through all motions free-on-wheels



When it comes to making cranes, Ransomes and Rapier know all that everybody else knows, and a bit more besides. So a new mobile crane by Ransomes and Rapier starts off with a terrific advantage, because you take for granted that its basic engineering and design will be utterly trustworthy. And when in addition a crane incorporates a whole team of brilliant new ideas, then you can be sure you're on to a world-beater. Like this brilliant new 511 mobile crane . . .

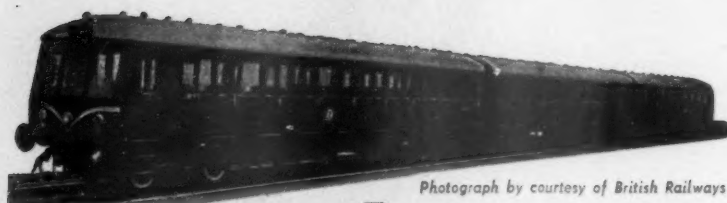
RANSOMES AND RAPIER LTD, IPSWICH AND LONDON

A NEWTON CHAMBERS COMPANY



# 511 Mobile Crane

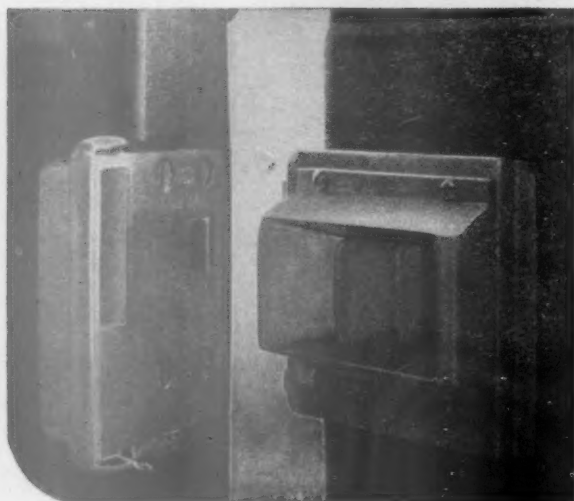




Photograph by courtesy of British Railways

# KAYE'S

## AUTOMATIC WEDGE LOCKS



have been in use on British Railways for more than 60 years; and are now being fitted to doors of Diesel Inter-City and Suburban Rail-Cars.

**JOSEPH KAYE & SONS LTD.**

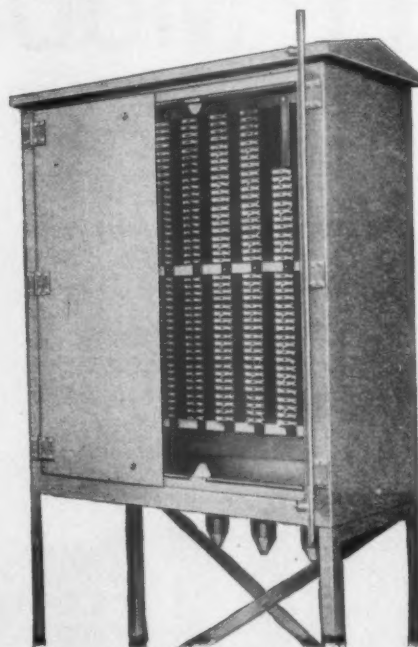
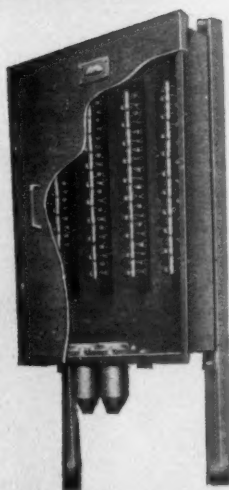
LOCKWORKS

**HUNSLET • LEEDS 10**

London Office: 1-5 New Bond Street, W.1

## RAILWAY ELECTRIFICATION DEMANDS RELIABILITY

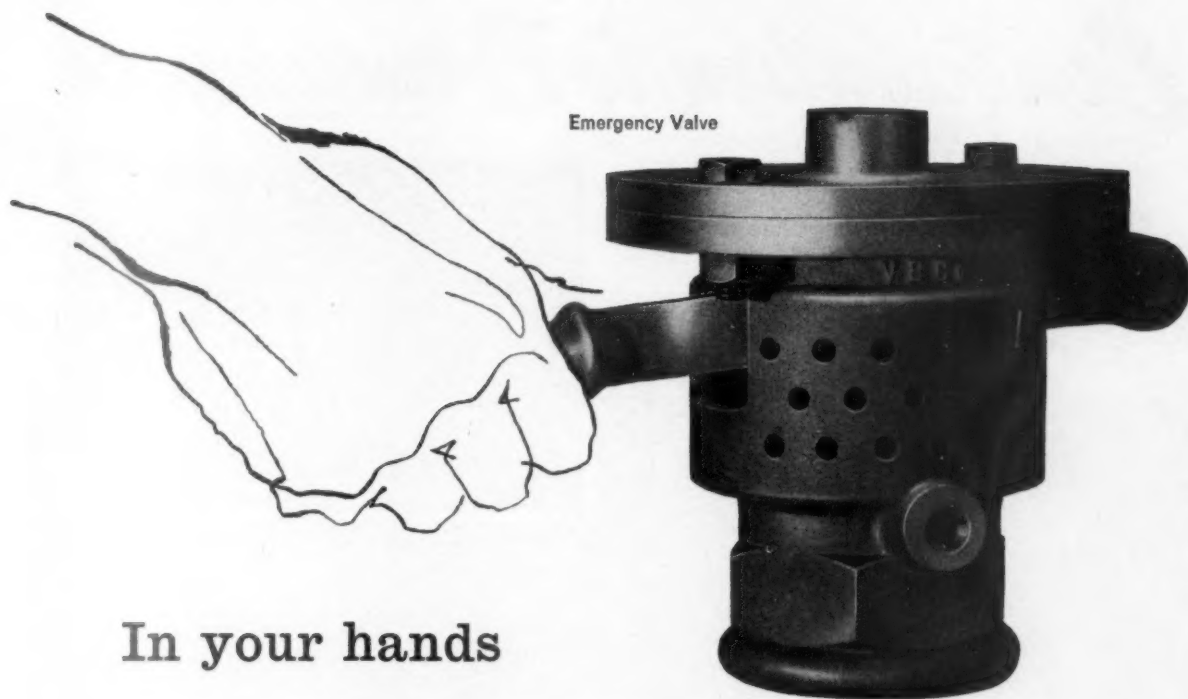
TERMINAL BOXES  
and  
CONNECTION CABINETS  
for  
BRITISH RAILWAYS  
TELECOMMUNICATION  
and  
SIGNALLING SYSTEMS



**AUSTIN TAYLOR ELECTRICAL LTD.**

THORLEY ST • FAILSWORTH • MANCHESTER

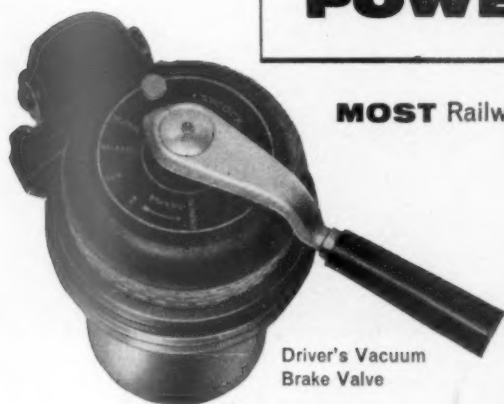
Tel:  
FAILSWORTH  
3246



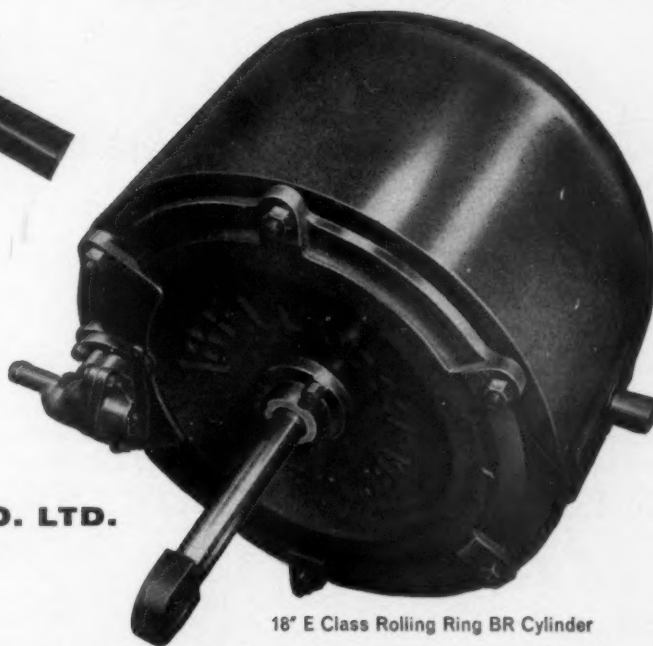
In your hands

**POWER TO STOP!**

**MOST** Railway Rolling Stock, at home and overseas, relies on  
**VACUUM BRAKES**



Driver's Vacuum  
Brake Valve



16" E Class Rolling Ring BR Cylinder

**THE VACUUM BRAKE CO. LTD.**

VICTORIA WORKS,

MILLHOUSES, SHEFFIELD 8

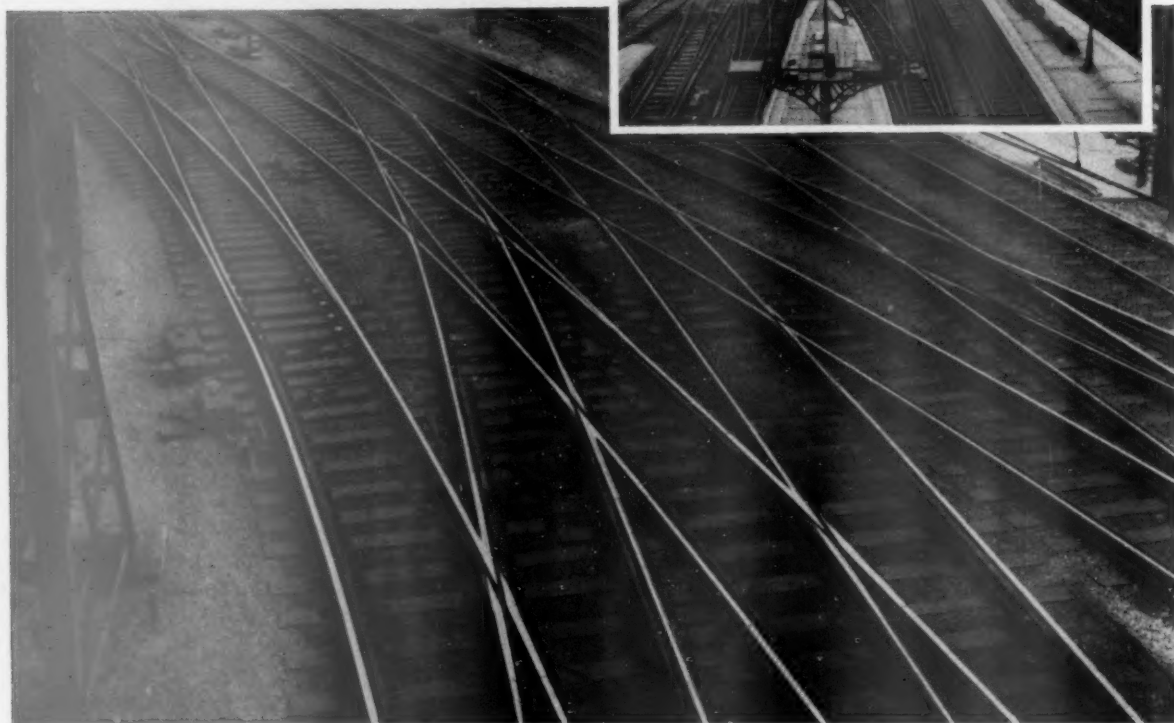
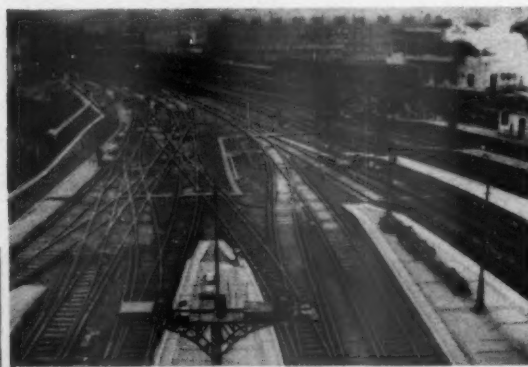
Member of the  **Birfield Group**

E

# Contribution to Permanence

## WATERLOO...

The crossings at the entrance to Platforms 1, 2, and 3 at Waterloo (Southern Region B.R.) are cast in one piece in Imperial Manganese Steel, and switches and many closure rails are rolled in this steel, to deal with the exceptionally heavy wear at this station.



Photographs by courtesy of British Railways

## LIVERPOOL STREET...



**EDGAR ALLEN & COMPANY LIMITED**  
IMPERIAL STEEL WORKS • SHEFFIELD 9

TO EDGAR ALLEN & CO. LIMITED, SHEFFIELD 9

T111/RG

Please send data on 'Trackwork' to:-

NAME .....

POSITION .....

FIRM .....

ADDRESS .....

Under the modernisation plans, the trackwork at Liverpool Street Station (Eastern Region B.R.) is being re-aligned and relaid. Edgar Allen and Company Ltd. have supplied crossings consisting of completely cast units in Imperial Manganese Steel and switches and closures in rolled Imperial Manganese Steel, of B.R. Standard 109 lb. section. These will give much longer life and need less attention and maintenance, despite the heavy traffic and new types of rolling stock now being introduced.



# The RAILWAY GAZETTE

INCORPORATING: THE RAILWAY ENGINEER • TRANSPORT • THE RAILWAY NEWS • THE RAILWAY TIMES • RAILWAYS ILLUSTRATED  
HERAPATH'S RAILWAY JOURNAL (ESTABLISHED 1835) • THE RAILWAY RECORD • THE RAILWAY OFFICIAL GAZETTE

A journal of Management, Engineering and Operation

VOL 115

FRIDAY SEPTEMBER 22 1961

No. 12

## CONTENTS

	PAGE
Editorial notes	321
Economic problems of the railways	323
French winter train services	324
The Italian State Railways in 1960	324
Southern Region traffic organisation	325
C.I.E. results improve	325
Publications received	326
The scrap heap	327
Overseas railway affairs	328
Re-organising the Supplies Department of the North Eastern Region	329
Power-signalling installation at Edge Hill	332
The International Union of Railways	336
Electric railway traction section	341
Personal	346
New equipment and processes	348
News articles	349
Contracts and tenders	350
Notes and news	351
Railway stock market and official notices	352

Editor: B. W. C. Cooke, Assoc. Inst. T.

33, TOTHILL STREET, WESTMINSTER,  
LONDON, S.W.1

Telephone: WHitehall 9233 (24 lines)

Telegrams: "Trazette Parl London"

Overseas telegrams: Trazette, London, S.W.1

### BRANCH OFFICES

GLASGOW: 139, Bothwell Street, C.2 Central 4646  
NEWCASTLE UPON TYNE: Cathedral Buildings, Dean Street, 1 Newcastle upon Tyne 22239

MANCHESTER: Century Insurance Building, St. Peter's Square Central 7667-8-9

BIRMINGHAM: 90, Hagley Road, Edgbaston Edgbaston 5454 (Three lines)

LEEDS: 70, Albion Street Leeds 27174

BRISTOL: 20, Victoria Square, Clifton Bristol 33873

Annually £5 by post Single copies, two shillings

Registered at the G.P.O. as a newspaper. Entered as second-class matter in U.S.A.



## An extraordinary outburst

THE September 15 issue of *The City Press* contained a long article under the by-line "British Railways' diesel blunder" entitled "Diesel upkeep makes diesel 'economy' a fallacy." According to an editorial in the same issue, the article was written by a leading authority on railways whose anonymity must be preserved because of his "position." Either by direct statement or by strong insinuation the article made the following claims: that the diesel-powered locomotive has become an object of high-pressure salesmanship and intensive, and even questionable, propaganda; that its present evolution has occurred largely as a result of the business acumen of the General Motors Corporation of America; that its American use has greatly, if not by implication entirely, resulted in the present economic plight of railways in the U.S.A.; that the Editor of the official journal of Indian Railways has been hoodwinked by American advertising propa-

ganda and that Indian "non-technical executives" are easy subjects for similar hoodwinking; that many railway officers are intimidated into silence by the dictates of fashion and the loud cries of the opposition, and that total dieselisation is the aim of the railways of this country. It also contained a panegyric to electrification and proposals for preventing "full-scale misplacement of investment funds." These include competitive districts wholly diesel operated against wholly steam-worked for six or eight years. The sweeping claim of the article's title was not substantiated and indeed not referred to save in a passing reference to the address given last November at the Institution (inaccurately termed "Institute" in the article) of Locomotive Engineers by Mr. H. F. Brown, a New York electrical consulting engineer.

## Sounding brass and tinkling cymbals

ALTHOUGH this tirade of nonsense is easily answered by anyone having any real knowledge of the railways and therefore might not appear to merit refutation, there is little doubt that statements such as those under review, made at a time when railways are at a low ebb and the target of what appears to be an organised *claque*, can produce aftertones of quite alarming proportions. There are many individuals who, knowing nothing of railway operation and difficulties, yet have strong views on how railways should be run. The *City of London*, and therefore possibly also the readership of *The City Press*, can be presumed to contain many influential men of this type. The unnamed author of the article under consideration also would appear to be an opinionated layman, though not of British nationality. In support of the latter view is the phrase "... there should be no hesitancy to organise right now a demonstration ..." which, coming at the very end of the article, apparently escaped the notice of the sub-editor. It is a pity that this outpouring was assessed of sufficient importance to justify the damage it might conceivably have caused to many innocent persons had it been better written and based on sounder arguments. Writers of anonymous attacks seldom consider the interests of those on whom official suspicion can fall, just because they "might" have been the author.

## Institution of Civil Engineers

THE syllabus of general meetings in the 1961-62 session of the Institution of Civil Engineers promises an interesting and varied season. There are three evenings which will be of particular interest to railwaymen. "Three prestressed concrete railway bridges" (Mr. F. Turton, October 3); "Freight handling," an informal discussion (introduced by Mr. E. C. Engledew and Mr. R. F. Stoessel); "The most appropriate training for a railway civil engineer," an informal discussion (introduced by Mr. A. H. Cantrell, Mr. S. Stevens, and Mr. H. Mallinson). Several other papers, though not specifically on railway subjects, would be of interest to those connected with station design and construction, and large scale civil engineering projects. Sir George McNaughton will be giving the presidential address on November 7, and the annual general

meeting will be on June 14, 1962. The annual dinner and dance will be held at the Dorchester Hotel, London, on April 5, 1962.

### U.I.C. in London

THE 60th session of the board of management of the International Union of Railways is to be held in London on September 26. The board, which comprises senior officials of 14 European railway administrations, usually holds four meetings each year, and this will be the first time that it has met in Great Britain. The Chairman is Mr. John Ratter, Member of the British Transport Commission, who holds the Chairmanship until December 31, 1962, and the British Railways representative on the board is Mr. J. L. Harrington, Chief Shipping & International Services Officer, British Transport Commission. The Secretary General, Mr. Louis Armand, is Hon. Chairman of the board of the French National Railway Company. One of the main questions on the agenda will concern automatic couplings, a matter of the very greatest importance and one which is the subject of considerable development at the present time.

### Edge Hill resignalling

THE new signal box at Edge Hill, Liverpool, which was opened on August 27 last, is described on later pages in this issue. It replaces four mechanical boxes, with a total of 226 levers, and controls part of the complex Edge Hill area. Much work has also been done at ten other boxes in the area. The Institution of Railway Signal Engineers is going to Edge Hill and Sandbach signalboxes on September 30 for its autumn technical visit. Sandbach, which was opened in June, 1959, contains an O.C.S. route-setting panel. In contrast Edge Hill has one of the first miniature-type panels in the country. It is on the route-setting pushbutton principle, and the panel of only 8 ft. x 3 ft. in size, replacing 226 levers, is a masterpiece of clarity for such a complex lay-out. Indeed the whole installation may well represent the limit to which miniaturisation of control panels can be carried. In any case, one consequence is a smaller structure, with a reduction in the total length of internal wiring, and one can hope that this will lead to a reduction in cost, particularly as the rewards for the concentration of control become greater as the complexity of the lay-out so controlled increases. When comparing Sandbach and Edge Hill, members of the Institution are likely to notice the progress in modern signalling even over a period as short as the last two years.

### Computing train performance

AMONG the work undertaken by the recently extended computer bureau of the English Electric Co. Ltd., at Kidsgrove, near Stoke-on-Trent, is the calculation of the performance of electric and diesel-electric traction equipment. Apparatus has been developed here for producing run curves from data supplied in digital form to a "Deuce" computer. This is a much faster process than obtaining similar information by analogue methods, and has the additional advantage that it is not necessary to have a traction engineer in attendance while the machine is working, but the process can go on under the supervision of the usual computer operator. Furthermore, the traction calculations may form part of a comprehensive system study carried out on the same machine, covering power supplies and many other matters. While most work of this kind takes place at the design stage, requests are also received, after equipment has gone into service, for assistance such as the calculation of limits of performance if motive power has to undertake heavier duties than were envisaged in the specification. Other calculations have established coasting distances for maximum economy in electric train working. This country has already acquired an international reputation in the com-

puting field, and today this new tool of the British traction engineer is adding to the prestige of the locomotive industry. Computers are already in specialised railway use in this country, and their wider application to assist railway techniques might commend itself to British traffic and operating officers.

### Railway development in Assam

AS WELL as East-Central India, where intense constructional activity is widespread to serve the heavy industries, one of the areas of greatest railway development in India is Assam. First there is rapid construction in hand to connect Siliguri with Calcutta by broad gauge *via* Malda—not in Assam but leading up to it. Then there is the important drive to increase the capacity of the Assam Rail Link between Siliguri and Assam from 15 to 24 trains each way daily (a) by consolidating its bridging and formation, (b) by constructing the great Brahmaputra Bridge, and (c) by installing 258 miles of C.T.C., the first in India. Thirdly, there is the construction of a 107-mile line eastward from Rangapura North, near Tezpur, along but not near the north or right bank of the Brahmaputra, and also parallel to and perhaps 75-100 miles from the Tibetan frontier. A study of the map will certainly suggest motives for all this heavy expenditure, strategic at least in part.

### Canadian National Railways in 1959 and 1960

ACCORDING to the C.N.R. annual report for 1960, operating revenue per route-mile operated in 1960 averaged \$27,787, a figure 6.6 per cent lower than that in 1959, when it was \$29,740. With 24,945 route-miles worked in 1960 as against 24,888 in 1959, total operating revenues decreased by 6.4 per cent to \$693,141,000 from \$740,165,000, and operating expenses fell by 4.9 per cent to \$705,818,000 from \$741,852,000. Revenue freight carried by the system in 1960 declined by 5.3 per cent to 77,689,000 tons from \$2,036,000 in the preceding year, and revenue passengers also fell 5.3 per cent to 12,024,000 from 12,694,000. Average revenue per ton of freight decreased by 3.1 per cent to \$6.77 from \$6.99, while average per revenue passenger rose fractionally by 0.6 per cent to \$3.19 from \$3.17. Average revenue per ton-mile fell by 4.1 per cent to 1.547 cents from 1.613 cents, and the average per passenger-mile rose 1.0 per cent to 3.190 cents from 3.159 cents.

### The Portuguese Railways in 1960

STATISTICS relating to the year ended December 31, 1960, recently issued by the Companhia dos Caminhos de Ferro Portugueses, indicate a noteworthy increase of 9 per cent in the total of passengers conveyed, which totalled 76,787 thousands. Moreover, this was achieved with an increase of 6 per cent in passenger-km. to 1,869,834 thousands, and 3 per cent in train-km. to 18,173 thousands. The passenger-km. per train-km. thus rose 3 per cent to 102.9. Route mileage remained unchanged at 2,219 miles, of which 1,744 miles are broad gauge (the Iberian peninsula standard of 5 ft. 6 in.) and 475 miles are metre gauge. Goods traffic made a less satisfactory showing at 3,698,119 tons, a drop of 1 per cent with an increase of 4 per cent (to 5,714 thousands) in goods train-km. The average net ton-km. per train-km. fell 3 per cent to 133.4. Passenger receipts rose 6 per cent to 411,981 contos, but gross traffic receipts (801,461 contos) rose by only 4 per cent.

### Pakistan Eastern Railway's Second Plan

THE Pakistan Government has approved the allocation of nearly £37 million for the development of the Eastern Railway during the Second Five-Year Plan period. Of this total, a sum of £21½ million is allotted for the purchase of 45 metre-gauge diesel-electric locomotives, 20 5-ft. 6-in. gauge steam locomotives, three narrow-gauge diesel locomotives, four two-car diesel railcar sets, 73 5-ft. 6-in. and 14 narrow-gauge coaching vehicles, and 5,077 metre- and 1,044 broad-gauge wagons.

A further £2.7 million is earmarked for improved signalling, additional terminal and yard facilities, and other line-capacity-increase works. For passenger amenities, electric lighting, foot-overbridges, approach roads, and the replacement of temporary by permanent structures at stations an additional sum of £327,500 is provided.

### Special-purpose wagon for Victoria

A RAIL wagon adapted to carry 220,000-V. cable for the Victorian State Electricity Commission was used for the first time in July last. Built at the Newport Workshops of the Victorian Government Railways, it had been designed to hold ten large reels, each weighing four tons and containing 3,500 yd. of steel-core aluminium cable. A 45-ft. bogie wagon was stripped of ends and sides, and fitted with special cradles. Each of these had a double layer of rubber cushions on which the cable reel was secured by wedges and rope lashings. The wagon was first used to transport cable from Melbourne to various points of the S.E.C. high-tension power extensions between Kerang and Mildura. In this area, 1,200 tons of cable, on 315 reels, were railed. Other special wagons are in service carrying stators and electric transformers up to 150 tons. Yet another is being constructed with 173-ton capacity.

### B.I.C.E.R.A. in 1960

THE Council of the British Internal Combustion Engine Research Association has reported on a year during which a good deal of progress has been made along various lines. The Association's research activities are undertaken by panels, such as, that dealing with pressure-charging, combustion fuels and lubricants, stress analysis, torsional vibration, noise reduction and so on. In each of these fields it is able to show that a good deal of useful work has been done, although the Noise Reduction Panel points out that past work in the laboratory while revealing ways the main components of diesel engine noise can be reduced substantially, in every case something would be added to the cost of production. In a highly competitive industry this makes difficult the acceptance of the remedial methods. It is accepted that the demand for "inexpensive silence" is a challenge to the laboratory. The report, and also a handbook which explains the purposes and advantages of membership of B.I.C.E.R.A., are well worth studying by engineers and manufacturers associated with internal combustion engines.

### Economic problems of the railways

THERE are obvious difficulties in the production of a report on a national basis which is both well-informed and also impartial, as those who are in a position to be sufficiently well-informed are influenced by their background and experience. A study made on an international basis by a group of persons of different nationalities but with generally similar problems can achieve greater impartiality, and we feel that this has been accomplished in no small measure by the recent report made by the International Union of Railways (U.I.C.) to the European Conference of Ministers of Transport (E.C.M.T.), and to which we referred briefly last week. Although expressing the railway point of view, the U.I.C. states it has resolutely rejected an approach in which all ideas are directed to defending the narrow interests of the railways, and that its considerations are independent of sectional rivalries. It is claimed that most of the views expressed, and conclusions reached, are valid in any country with a basically competitive economy, but are not applicable in those countries where the co-ordination of transport is planned deliberately. Railways are accepted as having the character of a public utility, forming part of the basic national economic framework, and railway modernisation is regarded as a necessity to the community, independently of the desires of the railway administrations

on egotistical grounds. It recognises that different means of transport have their own characteristics, but contends that analysis of these characteristics shows that railways still have great potentialities from a technical angle both as to the capacity and to the quality of the service they can offer. The report refers to the great advances achieved by railway administrations in the technical, commercial, and organisational spheres, exemplified by considerable increases in productivity and by reductions in costs, and notes that there is continued awareness of the necessity to continue with such efforts.

Although the formal relationship between railways and the State may vary from country to country, the report emphasises the general principal that it is the function of the Government to govern. This function is defined as ensuring good order and safety; the rational adaptation of the railways to present-day circumstances; and conformity to the requirements of healthy competition, particularly where the public interest is concerned. So far as the exercise of its functions is concerned, the opinion of the U.I.C. is that the State should make the minimum use of its powers, particularly where the free play of economic forces is sufficient by itself. The U.I.C. stresses the need for a general transport policy designed to secure the objectives (a) that the transport system in capacity and in quality should be able to meet present and future needs of users; (b) that artificial solutions should be avoided, enabling the respective means of transport to convey the traffic for which it is best adapted; (c) that free choice of the means of transport should be allowed to the user (including the provision of his own transport) subject to the proviso that he must pay an equitable price for the costs incurred by the community as a result of his choice, and (d) that the business of a public carrier should be profitable.

It is held that actions on the part of the railways will not be fully effective unless the public authorities allow them the means to do all that they should themselves do toward achieving financial equilibrium, including provision for depreciation and the establishment of necessary reserves. The means envisaged are generally to ensure as far as possible that the railways be permitted to act like an industrial or commercial undertaking and, in consequence, to avoid making the railways instruments of social or economic policy. These requirements are taken to include management autonomy, with maximum commercial flexibility in fixing the level of fares and charges and in undertaking expenditure, and wide freedom to reduce the size of their systems and to concentrate their services. For the avoidance of using the railways for purposes of social policy, a preliminary operation called "normalisation of accounts" is recommended. In effect, this is a system of commercial costing so that unremunerative expenditure might be eliminated, or charged specifically to the Government and not met by a "balancing item" which in public regard was identical with a subsidy. Items which should be charged to the Government are compensation for being required to maintain unremunerative facilities, "social needs" rates and charges, special rates to assist industry, or very low rates in favour of particular categories of users. In the view of the U.I.C., it is the duty of the Government to inform public opinion of the necessity for these reforms. The report adds: "The public should be made aware of the fact that the railways are a commercial undertaking serving the community, an undertaking which, while not having maximum profits as an objective, must not be called upon to assume too heavy burdens likely to undermine its profit-earning capacity."

The fundamental recommendation is that a general transport policy should be adopted, with the object of achieving "the optimum transport system," and considerable attention is given to the requirements for healthy competition, avoiding the disadvantages of either an authoritarian approach or of completely unrestricted competition—the latter is looked upon as impracticable. These prerequisites are defined as the need for equality in basic conditions; a proper structure of rates and fares as the basis for a rational choice by the user, and



consideration for the needs of the community. The U.I.C. does not conceal that these problems present considerable practical difficulties. Some of the suggestions recommend practices which have long since been adopted in Great Britain. These include adequate rules about working conditions to which all forms of transport are required to conform. Others involve matters of national taxation to an extent which make it unrealistic to consider them exclusively from the transport viewpoint. For example, it is premised that "the equalisation of basic conditions requires that, for each form of transport track, costs as a whole should be paid for by the users, and at the same time it should be ensured that those costs are shared equitably between such users . . . the share corresponding to the use it makes of the track." Many will regard this as an excursion into the realms of theoretical economics with little practical possibility. The cost of administering such a system in relation to road transport could be prohibitive. Similarly, some of the considerations as to a proper structure of rates and fares seem inconsistent with the emphasis on commercial flexibility. The clear recommendation emerges that rates and charges, in their aggregate, should ensure overall financial equilibrium to the carrier, without subsidy, and that each rate should contribute something to this financial equilibrium thus being above (or at least equal to) the direct costs concerned. Such a policy should allow railways to de-standardise rates and fares and to conclude special agreements with their customers. The U.I.C. considers that, in view of the general development of transport facilities, a less stringent approach to public service obligations might be adopted. In any event, where equality of basic conditions cannot be achieved, the U.I.C. policy is for the State to assume responsibility for specific abnormal burdens and obligations by means of refunds or compensation.

### French winter train services

**A**N UNUSUAL number of winter alterations, in practically all cases involving accelerations, appears in the French winter timetables for 1961-62, operative from October 1. A new German diesel train, first and second class with supplementary fare but not in the T.E.E. category, is to run between Frankfurt and Paris *via* Saarbrücken, Forbach and Metz; through coaches and sleeping cars have worked by this route but never before a high-speed diesel train. Leaving Frankfurt at 7.20 a.m., Saarbrücken at 10 a.m., and Metz at 11.7 a.m., the express will run from there *via* Bar-le-Duc and the Eastern Region non-stop over the 220 miles to Paris in 3 hr. 6 min. (71 m.p.h.)—the fastest time ever scheduled between the two cities—arriving at 2.13 p.m. Return will be at 4.43 p.m., reaching Metz non-stop at 7.50 p.m., Saarbrücken at 8.51 p.m., and Frankfurt at 11.33 p.m.

Extension westwards of the Eastern Region Strasbourg-Paris main-line electrification, which has now reached Chateau Thierry, 36½ miles from Paris, is permitting further accelerations of the trains on this service by 5 to 10 min.; train No. 103 (6.52 p.m. from Paris Est) is to be speeded up by 24 min. to Nancy. On the Northern Region, the 4.39 p.m. from Aulnoye is to start at 5.11 p.m., after the passage of the T.E.E. "North Star" (instead of waiting at St. Quentin to be passed by the latter), and by accelerated running will reach Paris Nord 1 min. earlier, at 7.39 p.m.

On the Paris-Le Havre main line of the Western Region, in response to public demand, the first class-only 8 p.m. from Paris St. Lazare is to start at 7.33 p.m. and arrive at Le Havre at 8.28 p.m., 25 min. earlier. There is also to be a complete re-organisation of the morning and evening service between Paris and Nantes, Brest, and Quimper. The 8.5 a.m. from Nantes will start 6.30 a.m., with a new connection from Rennes at 6.33 a.m., and to reach Paris Montparnasse at 10.21 a.m. The present 5.15 a.m. first class railcar connection at Nantes with the 8.5 a.m. will start at 6 a.m., and run instead *via* Redon to Rennes, where it will connect with the 6 a.m. from Brest

(now 5.45 a.m.), arriving in Paris at 12.24 instead of 12.37 p.m. The total acceleration will be 28 min. from Brest and 31 min. from Quimper. Nantes will have a connection at 8.10 a.m. into this train at Le Mans.

In the westbound direction the 6.30 p.m. from Paris to Nantes, and the 7.5 p.m. to Brest are to change places; the 6.30 p.m. will reach Brest at 12.40 instead of 1.49 a.m. (34 min. acceleration), and the railcar connection from Rennes will be in Quimper at 12.39 instead of 1.14 a.m., 35 min. faster. The 7.5 p.m. from Paris, diverted to Nantes, will reach that town at 11.3 p.m. By these far-reaching improvements both Quimper and Brest will be added to the numerous French towns and cities that can be reached at an average speed of over 60 m.p.h. from the capital, as well, of course, as Nantes.

Last winter a new first class-only express called the "Capitole" was put on to run three days in each week between Paris Austerlitz and Toulouse; leaving Paris at 5.20 p.m., and running non-stop over the 248½ miles to Limoges in 208 min. (71.6 m.p.h.); it called thereafter at Brive-la-Gaillarde, Cahors and Montauban only, and reached Toulouse in the unprecedentedly fast time of 7 hr. Return was at 5 p.m. from Toulouse, with a Paris arrival at midnight. This express was suspended for the summer, but is now to be reinstated, and will run from Monday to Friday inclusive in each week up to the beginning of June next.

On the South-Eastern Region main line the 4 hr. 5 min. "Aquilon," at 7.25 p.m. from Paris Lyon to Dijon and Lyons (only 5 min. slower than the "Mistral") and the corresponding return train, will be reinstated, and will run on Sundays in addition to Mondays to Fridays inclusive as hitherto. In connection with the southbound "Aquilon," the 11.55 p.m. from Lyons to Valence will run 15 min. earlier, so reducing the wait at Lyons from 25 to 10 min. The 4.40 a.m. from Nîmes to Tarascon, Avignon, and Valence is to start 20 min. earlier, and to form the 7.10 a.m. (altered to 7.22) from Valence to Lyons, where connection will be made with the fast 9 a.m. to Paris; this will give a new early morning service from Avignon (5.34 a.m.) and Valence to Paris, with an arrival at 1.45 p.m. Previously the two connections missed one another by 25 min. at Valence.

Some temporary deceleration, ranging from 5 to 20 min., is to take place between Miramas, south of Avignon, and Marseilles, Nice and Vintimille, due partly to continuation of the electrification from Paris and partly to some extensive engineering work. Due to the increasing popularity of winter sports in the French Alps, six seasonal express services between Paris and St. Gervais and Bourg St. Maurice are to have extended periods of operation.

### The Italian State Railways in 1960

**T**HE following are some of the features of the Italian State Railways annual report for 1960. Despite increases of 5 per cent in the number of passengers and 20.6 per cent in the freight tonnage carried, the deficit was 59.7 milliard lire, 30 per cent higher than in 1959. This unsatisfactory state of affairs arose from the fact that higher wages were mainly responsible for greatly enhanced operating expenditure. A Government Commission of three experts is now investigating the financial burdens of the railways. Its first move is to "normalise financial statements" so that real profit or loss can be readily seen. It has found that a very high percentage of all passengers carried travel at Government-privilege reduced rates. Also that goods traffic is so heavy that main lines and yards are working to capacity. Increase in the tonnages of iron and steel products and raw materials have reached 40 per cent.

Improvements are being effected by the introduction of piggyback traffic on the French V.F.R. system between Paris and both Milan and Turin in co-operation with the S.N.C.F. and the introduction of the railhead system for smalls traffic is being considered. Continuing changes in motive power have now reached the point where 64.8 per cent of all trains are



electric- and 23 per cent diesel-hauled; only 12.2 per cent have steam locomotives. Over the 48 per cent of the whole system electrified, 85 per cent of all traffic is worked today. More than one-quarter of the total route-mileage, 16,427 km., is now double line. Doubling of the Genoa-Modane and Genoa-Ventimiglia lines are included in the improvements programme, as also is the electrification of the Bolzano-Brennero line. Shorter working hours and increasing traffic have necessitated an increase of 9,779 in the staff employed, the total number being 165,136.

### Southern Region traffic organisation

THE Southern Region is the last of the British Railways regions to complete the major steps in remodelling its traffic organisation on the "line" principle. On October 1, almost three years from the date when its first operationally-autonomous line management came in being on the south eastern division, responsibility for day-to-day running of the rest of the region will be handed over to Line Traffic Managers of two new divisions. These will correspond with what have long been thought of as the central and south-western sections.

The setting-up of the South Eastern divisional line traffic management accompanied the creation of a unified Regional Traffic Headquarters at Waterloo headed by an Assistant General Manager (Traffic). This took over the responsibility of the former headquarters of the Chief Operating Superintendent, the Chief Commercial Manager, and the Motive Power Superintendent, as far as the area outside the South Eastern Division was concerned. It dealt directly with the remaining District Traffic and Motive Power Superintendents on one basis, and with the Line Traffic Manager on another. This did not create any major administrative ambiguities, largely because of the history and character of the railway.

For many years the three departments—Operating, Commercial, and Motive Power—had to some extent already integrated their functions up to a fairly high level in the management structure. Considerable day-to-day powers had been delegated to the district officers, who, as District Traffic Superintendents, had been responsible for both operating and commercial matters. This meant that during the recent three-year transitional period over a large area of policy, broad directives could be given to the District Traffic Superintendents in the same way as to the Line Traffic Manager in the newly-created division, even though the L.T.M. had far wider discretionary powers.

On the positive side, the staged approach has meant a chance to test thoroughly a particular pattern of the line organisation devised to meet specifically Southern conditions before applying it on a full scale.

The pattern of line management on the South Eastern Division has stood up to this three-year test extremely well and, with minor modifications, will be used for the new Central Division. It has provided a large enough unit of operation to co-ordinate efficiently the most intensive network of commuter services in the world, while being flexible enough to bring imagination and direct leadership to bear in the more elastic fields of freight business and the exploitation of passenger capacity.

The pattern is much the same as elsewhere on British Railways, but what might appear to be only minor differences are an important recognition of the dominance of passenger traffic and the comparative compactness of the region. The Line Traffic Manager has no Assistant Manager as such. There is a Traffic Superintendent who supervises all passenger commercial matters and also passenger and freight operation. This is because passenger commercial work and operating matters are considered as closely related, and freight movements are also dependent on passenger operation on such an intensively worked system. The commercial side of freight traffic falls naturally into a separate field of activity and there is a Freight Commercial Officer responsible to the Line Traffic Manager.

A Passenger Officer as well as Operating and Motive

Power Officers assist the Traffic Superintendent. Lower levels of organisation reflect this emphasis.

Maintenance of rolling stock remains the responsibility of the Chief Mechanical & Electrical Engineer. Similarly public relations are handled in a central department at regional level, but on the basis that the department offers a service, as required, to the Line Traffic Manager.

In the case of the South Western Division the organisation has not been modified but it has been extended. This division may be seen as a long-distance main line with more normal railway characteristics and problems superimposed on a typical Southern commuter network. To meet this situation the basic line pattern has been supplemented by retaining a district traffic and motive power organisation within the division.

District Traffic Managers at Woking, Southampton, and Exeter will exercise a large degree of responsibility for both operating and commercial matters, working under the direction of the Line Traffic Manager, as will District Motive Power Officers at Woking, Eastleigh and Exmouth Junction. The Line Traffic Managers will take over most of the responsibilities formerly exercised by the head of the traffic department.

The Line Traffic Managers will be responsible to the General Manager; and there will be a general supervision of traffic matters at regional headquarters exercised within the General Manager's office.

There will be an Assistant General Manager primarily concerned with traffic matters, who will act as the General Manager's adviser and representative in traffic matters. He will be responsible for co-ordinating the work of the divisions, assisted by a Movement Officer and a Commercial Officer. Financial, administrative and works and planning matters will come under the wing of a separate Assistant General Manager.

One important feature of this streamlining of regional management is the appointment of a Works & Planning Officer with small teams of specialist assistants. These will be concerned with providing information on which future Southern developments and other action will be based; with phasing and co-ordinating modernisation; and with budgetary matters.

### C.I.E. results improve

ENCOURAGING results for the year to March 31, 1961, the second of a five-year period in which the system is charged with eliminating deficits, is reported by Coras Iompair Eireann. The net deficit dropped to £246,174 compared with one of £709,006 in the preceding year. The annual report, signed by the Chairman, Dr. C. S. Andrews, reveals an increase of £969,091 in operating income at £18,737,314, and a smaller rise of working expenses by £545,395 to £18,316,660.

Principal results for the last two years are as follow:—

	1960-61 £	1959-60 £
<b>Railways:</b>		
Passenger receipts ... ..	3,708,498	3,513,452
Goods receipts ... ..	4,591,481	4,267,007
Miscellaneous receipts ... ..	75,933	70,301
Total receipts ... ..	8,375,912	7,850,760
Expenditure ... ..	8,853,383	8,704,729
Loss ... ..	477,471	853,969
<b>Road Passengers:</b>		
Receipts ... ..	6,912,739	6,779,706
Expenditure ... ..	6,148,434	6,031,016
Net receipts ... ..	764,305	748,690
<b>Road Haulage:</b>		
Receipts ... ..	2,385,741	2,094,269
Expenditure ... ..	2,253,193	1,951,783
Net receipts ... ..	132,548	167,115
<b>Canals, loss ... ..</b>	<b>51,186</b>	<b>79,317</b>
<b>Docks &amp; Harbours, loss ... ..</b>	<b>10,873</b>	<b>9,598</b>
<b>Hotels, refreshment rooms &amp; restaurant cars, net receipts ... ..</b>	<b>76,573</b>	<b>60,300</b>
<b>Total loss ... ..</b>	<b>246,174</b>	<b>709,006</b>

The commercial campaign initiated in 1959-60 for increased freight and passenger traffic was continued successfully, and a further 400 package deals were completed with an estimated additional annual revenue of £430,600. The major reorgani-

sation of management, implementing a policy of de-centralisation into five areas, has shown encouraging results. Local supervision is more effective, and decisions affecting customer services are made more rapidly. Management accounting has been developed to include a new system of analysis and classification of expenditure.

The rail section of the organisation returned increased revenue of £525,152, and operating expenses rose by only £148,654. Revenue from railway freight services was £324,474 more than in the previous year, and receipts from passengers improved £195,046. Road passenger additional income of £133,033 was more than matched by higher expenditure of £117,418. An operating profit of £132,548 was achieved in the road freight section, where mileage rose 10 per cent, tonnage 18 per cent, and receipts 14 per cent. There was increased revenue from merchandise traffic, more extensive working with county councils, and receipts from new container ferry traffic. Revenue from the seven Great Southern hotels and the Board's catering services went up £106,640 and the net profit of £76,573 was £16,265 more.

The sale of rolling-stock and railway lines, land and buildings amounted to £405,892, of which £173,847 was credited to

appropriation account and £232,018 to capital reserve. Work study and production control were continued and extended. During the year the Board's workshops turned out 200 covered-goods wagons, 20 goods brakevans, 14 main-line carriages, five heating vans, and 60 double-deck buses, as well as completing a comparatively heavy programme of additions to and renewals to the road-freight fleet.

Rail sections found to be uneconomic and substituted by road services were Waterford-Tramore, West Clare, and West Cork. Full economies accruing from these decisions are not reflected in the present accounts. Except for some small stations, these were the final sections of the railway system to be replaced by road services within the five-year period set by the Transport Act of 1958. Three trains of high standard, the "Faile" and "Slainte" between Dublin and Cork and the "Cu na Mara" between Dublin and Galway, were introduced.

In spite of the bus strike early in 1961, which caused a revenue loss of £159,000, relations with the unions were generally close and good. Conversations have been initiated on the possibility of a long-term agreement covering wages and conditions. The average number of staff was little changed at approximately 21,000.

## PUBLICATIONS RECEIVED

*The Golden Age of Tramways.* By Charles Klapper. London: Routledge & Kegan Paul, Ltd., Broadway House, 68-74, Carter Lane, E.C.4. 8½ in. x 5½ in. 327 pp. + 30 pp. plates. Price 40s.—This fascinating volume provides, for the first time within our knowledge, a well-written and balanced account of the rise, brief golden age of prosperity, and decline of the application of the rail to street transport in Great Britain. Publications on tramways are numerous—the selection quoted in this book occupies four pages—but most have dealt with but one area or one aspect. Here the author has dealt with the tramway as a means of urban transport, including the vehicle, the means of traction, the track, and its traffic. It was, as he rightly says, "a harbinger of social change, which continued and developed the work begun by the suburban railway services in enabling workers to move easily and cheaply between industrialised areas and their homes in more pleasant surroundings."

*"English Electric" Traction.* Over forty examples of diesel-electric and electric locomotives and rolling stock which have been supplied complete or provided with power equipment by the English Electric Co. Ltd. are illustrated in this publication. Every example is accompanied by brief notes on the services operated, routes and gradients, and tables of principal dimensions and data. The selection comes as close to the present as the Type 5 "Deltic" diesel-electric locomotives for the Eastern, North Eastern and Scottish Regions, and also goes back to the 1930s in connection with several series of multiple unit trains for railways overseas. Still longer con-

tinuity of experience in traction is recalled by an illustration of an industrial electric locomotive supplied recently to the National Coal Board to supplement nine others built by a constituent of the present company between 1908 and 1913. While concerned mainly with traction equipment supplied in quantity, the booklet rightly gives space to the 1,600-h.p. diesel-electric locomotives Nos. 10000 and 10001 which were the first main-line diesel-electrics to operate in Great Britain, and while working on the Euston-Glasgow route ran 803 train-miles daily.

*Westinghouse signal catalogue.* The Westinghouse Brake & Signal Co. Ltd., has issued three new sections for its signal catalogue. The first is a specification sheet for the d.c. thermal time delay relay, style PTT1. The second section, entitled "The unit system of relay room furniture," covers the latest range of relay racks, miniature termination racks, and relay room wireways. It is well illustrated with photographs and drawings, and a series of tables give the full specifications. The final section deals with signalling equipment for South African Railways, Rhodesia Railways, and East African Railways & Harbours. The text describes the work carried out in considerable detail and is accompanied by diagrams and photographs which show very clearly the equipment as installed.

*Thermocouples.* The Cambridge Instrument Co. Ltd. 13 Grosvenor Place, London, S.W.1, has issued a publication (List 325) describing their standard range of rare- and base-metal thermocouples for temperatures up to 1,500 deg. C. In

general, thermocouples are manufactured to customers' specifications and for particular applications, but certain types of thermocouple assemblies, which have been continuously in demand, are now produced as a standard range. The publication gives details of the factors governing the choice of suitable assemblies for widely differing applications, and describes a coding system which simplifies the ordering of stock assemblies and replacement parts.

*The Professional Engineer—His Employment and Development.* This booklet, published by the Engineers' Guild Limited contains the proceedings of the conference held by the Guild on March 22, 1961. The conference was addressed by Mr. D. J. Mann, Director and Head of Personnel Division, Unilever Limited, on "The Engineer and the Technician"; by Mr. A. R. Cooper, Member for Operations & Personnel, Central Electricity Generating Board, on "The Engineer in Management"; and by the Rt. Hon. the Viscount Chandos, Chairman, Associated Electrical Industries Limited, on "The Engineer in Society." The three papers are printed in full, and there is a detailed account of the discussion which followed.

*Open-Coil Annealing.* An eight-page publication, issued by the Incandescent Heat Co. Ltd., Cornwall Road, Smethwick, Birmingham, describing this method of annealing. The process is a recently-developed one and is applied to sheet and tin-plate. It is claimed to combine the best features of conventional box and continuous annealing without their inherent disadvantages.

## The Scrap Heap

### The 1911 strike—a sequel

Particular interest attached to the Board of Trade returns issued in the first week of September, 1911, as they constituted the first official statistics regarding the calamitous effect upon the trade of the country of the 1911 dock and railway strikes to which we referred in our August 25 issue. Compared with the returns for the month of August of the previous year, the figures worked out as follows: Imports £50,605,513 (decrease £1,413,314); exports £36,082,700 (decrease £2,556,183).

### The "Spinner"

An oil painting of the "Spinner," a locomotive designed for the Midland Railway in 1897, has been presented to British Railways and now hangs in Mr. T. F. B. Simpson's office at Derby Locomotive Works. The locomotive had a top speed of 90 m.p.h. and acquired its name from a persistent wheel slip when starting. The painting is an early work of the Derby artist Harry Stark, and hung for a number of years in the kitchen of Mr. John Hackett, the artist's nephew.

### Appreciation

The praiseworthy action of a Checker at Curzon Street goods station who noticed that a package for export to St. Kitts in the West Indies had been consigned to the wrong port of loading saved a Glasgow company about two months delay and brought the following appreciation from the Chairman.

"... I have no doubt that the direct result of the action of British Railways through your assistant with initiative, is reflected in the speed with which the machine is repaired in St. Kitts and will enhance British goods and service, in the West Indies.

"In these days when it is a practice to decry British Railways' service, we wish to make quite clear that we have had first class service and that you did in fact go well out of your way to aid us, and through us British goods and service."

### Electric veteran

A 3,000-volt direct-current bi-polar gearless locomotive, which has been in service for 40 years and which has travelled over 2 million miles on the Chicago, Milwaukee, St. Paul & Pacific Railroad, is on display at the National Museum of Transport, St. Louis. The locomotive is one of five which have been withdrawn recently from service. They were built by the General Electric Company at the



Painting of the "Spinner" presented to British Railways by the artist's nephew

Locomotive & Car Equipment at Erie, Philadelphia, in 1919-20, and specially designed to haul passenger trains over the steep grades and sharp curves of the 220-mile electrified main line through the Cascade and Saddle Mountains in the state of Washington. Each was 76 ft. long and developed 3,200 h.p. They operated from an overhead trolley wire.

### Ever ready

A poster currently displayed in a train on the Metropolitan Line says: In the event of a gas attack, keep the windows up. Always have your gas mask with you.—*Londoner's Diary*, "Evening Standard," August 24.

### "Tiddleydike" closure

During the last week of operation on the "Tiddleydike" branch, the Cheltenham to Andover line closed by the Western Region of British Railways on September 9, each trip took on the air of a last journey. Small boys climbed down from the coaches to take photographs as the train paused at remote halts and, at Cirencester, a middle-aged man and his pretty daughter walked forward to shake hands with the driver and bid the train a last farewell.—*From "The Daily Telegraph," September 9.*

### Praise indeed

The tour of Iona, run by the Eastern Region of British Railways recently, was interrupted on the return journey by a landslide between Tyndrum and Crian-

larich. The 315 passengers were taken 60 miles by special bus to Callander and by special train to Edinburgh, from whence another special train conveyed them to Colchester. The following is the text of a letter since received by the Eastern Region:—

DEAR SIR,

As the managing director of a public garage I should not be writing this letter but as a passenger on the Ipswich-Oban special of last weekend I must congratulate British Railways on their performance in giving a most interesting and pleasurable time.

I consider the crew were exemplary, and the service on the train from every member of the staff left nothing to be desired.

I would like to add that when we had to leave the train at Taynuilt the whole operation was carried out with courtesy and precision and I and many other members of the public who although disappointed had nothing but praise for every one of the crew.

As far as I am concerned I am looking forward to doing this trip again if it should go next year, and I do feel that as far as long distance travelling is concerned you will win back many motorists like myself who are tired of hanging about in traffic jams.

I would wish you every success if you decide to run any more excursions like this and power to your elbow.

Yours faithfully,  
Signed A. W. STAPLES.



# OVERSEAS RAILWAY AFFAIRS

FROM OUR CORRESPONDENTS

## DENMARK

### Three-deck 400-car ferry vessel

The State Railways administration has ordered a motor-car ferry vessel for service between Funen and Zealand by the Store-Bælts route. It is believed to be the first with three decks for motor-cars ever constructed, and will accommodate 400 cars.

## KOREA

### Line to develop mining area

Work has begun on the construction of a 10-mile railway near the Taebak Mountains in north-western Korea as part of a scheme to develop the mining area.

## UNITED STATES

### A.A.R. road-rail track-testing car

The detector car laboratory of the Association of American Railroads has developed a track-testing car which can run on rails and on roads. It can be transferred rapidly and without interfering with rail traffic from one test length to another, using level crossings or goods yards as transfer points. By using transistors it has been possible to fit the testing equipment into about one-tenth of the space occupied by equipment used in the association's on-track cars. The new cars, costing only

a little over £1,000 each, are also considerably cheaper than the on-rail variety. The A.A.R. has three of these cars, one available for leasing to various railways. The residual magnetic system is used for testing the rails for flaws as in the ordinary rail-test car.

### Argentine brake manufacture

The Westinghouse Air Brake Company, U.S.A., has reached an agreement with Siam di Tella, of Buenos Aires, for the

manufacture of Westinghouse railway brake equipment for the Argentine market.

### Chicago suburban cars

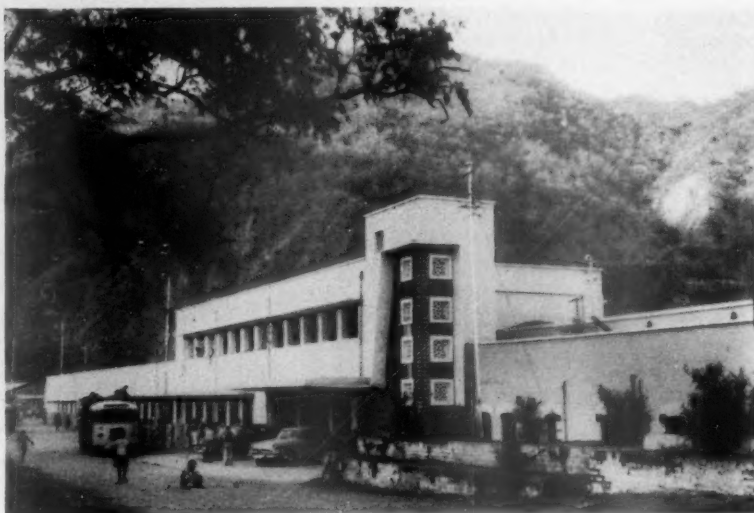
With the acquisition since July of 40 air-conditioned stainless-steel coaches, the Chicago suburban services of two Class I railroads, the Milwaukee and Chicago North Western, now have 240 double-deck coaches of modern type, each seating 150-160 passengers in a length of about 85 ft. These coaches are grouped generally in push-and-pull sets with a 1,800 to 2,000-h.p. diesel locomotive at one end, and have mechanically-controlled wide centre doors taking three passengers abreast.

## WESTERN AUSTRALIA

### Bridge over the Blackwood River

Work has begun on the construction of a bridge over the Blackwood River at Bridgetown on the Western Australian Government Railways' south-west line 174 miles from Perth. The bridge will be over 500 ft. long and will have four continuous 100-ft. prefabricated steel spans with a 50-ft. flanking span at each end. The superstructure will be 50 ft. above the river bed. Its 400-ft. continuous girder span will be rolled in position by the cantilever method.

## STATION CONSTRUCTION, INDIA



Frontage of Kathgodam Station, North Eastern Railway

## STATION CONSTRUCTION, NEW ZEALAND



Frontage of station under construction at Napier





*Pallet stacking in central store at Shildon*

## MODERNISING THE SUPPLIES DEPARTMENT of the North Eastern Region

THE Supplies & Contracts Manager's Department of a railway has no window on the world and neither the railway's customers nor the public in general can, in the ordinary course, be directly aware of the work of the department nor the part it is called upon to play in the modernisation of British Railways. The implementation of the modernisation plan in the North Eastern Region has inevitably had a considerable impact on the Supplies & Contracts Department. The plan has necessitated changes and modernisation in the whole field of custody and distribution of supplies, quite apart from improvements which would in any case have been called for by present-day developments in storage and handling techniques. This process is likely to quicken rather than slacken as the modernisation programme proceeds and

### Changes and improvements in custody and distribution of essential supplies

*by H. BELL, Supplies & Contracts Manager,  
British Railways, North Eastern Region*

technology progresses, so that the stores staff can look forward with confidence to an interesting job on British Railways in the days ahead.

The changeover from steam to diesel and electric traction alone has brought its own special problems. The wheels, main members, and bodywork of the traction units are essentially the same for steam, diesel, and electric working, but the power machinery, particularly of the

diesels, is much more delicate and works to finer limits than ever was the case with the steam engine. Many of the parts are strange and have unusual names and descriptions for staff who have grown up with big ends, copper tubes, fireboxes, and brick arches. Identification with makers' catalogues is far from easy, even for technically trained staff, and storemen do not usually come within this category. By and large the parts are more numerous,

tend to be smaller and much more care and cossetting has to be given to their handling and storage. At the main locomotive store in the Region the number of items stocked has increased by over one-third to top 40,000 and is growing at an increasing rate as new types of diesel traction are introduced. A complete mental re-orientation is necessary for many of the stores staff if their work is to be done properly and efficiently.

#### Increasing complexity

Railway equipment generally tends to become more complex with the march of progress, and the application of science to practically every field: the relatively simple and straightforward mechanical signalling is rapidly being replaced by the more intricate power and colour-light signalling; coaching stock grows more specialised as more comfortable and specially equipped vehicles are introduced—a modern passenger-carrying vehicle can have as many as 3,000 different components. The same trend is apparent in the freight vehicles, whether it be the general substitution of the vacuum brake for the former hand brake, or the substitution of pallet van or bulk wagon for the common or garden general-merchandise wagon and the mineral wagon.

Mechanised marshalling yards, modernised conveyor-belt freight depots, all bring their quota of more intricate machinery—and consequently spare parts for

available on tap to provide a supplies service for the Regional officers already located there responsible for building, repairing, and servicing locomotives, wagons, and coaching vehicles, and maintaining the permanent way, signalling, and traffic services throughout the North Eastern Region. This is an immense advantage in providing the day-to-day on the spot contacts essential in an efficient supplies service. At the same time, the location of the Regional Headquarters some 200 miles nearer the scene of stores activities considerably facilitates administration and permits quicker decisions and actions required to meet the present production tempo at railway works and the conditions of a seller's market.

#### Centralised control

As from January last, except for stores in course of production or in the custody of the "using" departments as working stocks, all supplies were brought within the direct control of the Supplies & Contracts Manager and his staff, or are, for convenience and economical working, controlled for him by certain departments on an agency basis. The principal change at that time was to bring the control of permanent way stocks under the Supplies & Contracts Manager, the Chief Civil Engineer continuing to look after these stocks on an agency basis instead of by direct control.

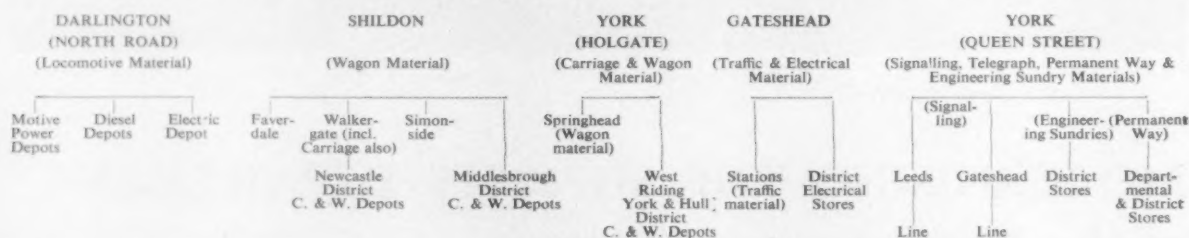
The chart below shows the main stores

Each depot has its own characteristics of stocks and premises, and in consequence each must be investigated on its own merits when improvements are contemplated. Preconceived ideas based on experience elsewhere may well lead one astray. Not that experience can be discounted altogether; the advice of the various firms specialising in handling and storage equipment, and the knowledge gained by other Regions of British Railways have helped considerably in the preparation of schemes in which full use has also been made of work study techniques.

Wherever practicable, palletisation of suitable stocks is adopted in order to reduce labour costs, conserve space, and avoid damage. Flat, post, box, and wire-mesh pallets have been used extensively, and tipping pallets are used for non-ferrous scrap. In many cases block-stacking of pallets is possible but where selectivity is essential through variety or need for rotation of stocks, pallet racking for flat wooden pallets has been successfully used.

#### Maximum benefits

The maximum benefits are achieved when commodities are transported in pallets throughout their journey from point of manufacture, through storage, to point of use. Progress in this direction has been secured with articles made and used within the same works, and the



maintenance and operation. Designs are constantly being changed and improved and the process must continue in a thoroughly live organisation like British Railways.

How are these changes being reflected in the procedures for the storage of equipment and its handling in the North Eastern Region? The answer can conveniently be made under three main headings:—organisation, modernisation of accommodation and equipment, and staff conditions.

#### Organisation

There has been a radical improvement in organisation. The former bi-regional Supplies Headquarters for the Eastern and North Eastern Regions located at Kings Cross has been replaced recently by separate Headquarters located in London for the Eastern Region and at York for the North Eastern Region. There is now at York a central organisation

and chain of distribution for supplies in the Region.

#### Re-designation of officers

In 1960 the opportunity was taken to re-designate the officers in charge of the main stores. These officers may be responsible for the maintenance, storage and issue of stocks worth at any one time some £2 million. Their previous title of "storekeeper" gave no conception to the general railway staff or the trade of their duties and responsibilities, and their new title of Supplies Depot Manager more accurately reflects their status.

The total day-to-day value of supplies in the Region is over £11 million, and the annual turnover is very much higher. Almost every conceivable type of article is dealt with, and the weight, size, and shape, range from the infinitesimal to items which can only be handled with the aid of mechanical equipment.

extension of the practice to items purchased from private firms is being pursued. Already manufacturers are supplying firebricks in pallets conveyed in pallet wagons.

Palletisation necessarily involves the provision of a pallet-mover, and here the choice is wide. The prime importance of making full use of air-space points inevitably to a fork-lift truck rather than a simple pallet truck. Further selection beyond this depends on the characteristics of the depot. Where individual warehouses within a depot are necessarily widespread, or space not at a premium, the general purpose fork-lift truck commands itself, but where the emphasis is on concentration, reach or side-loading fork-lift trucks with their ability to operate in narrow aisles provide a more satisfactory solution.

Many of the stockheads are unsuitable for palletisation and must be housed in racks. Here again there have been great

advances in design which have brought considerable benefit. Previously racking often consisted of a heterogeneous collection of wooden or iron bins incapable of being readily adapted to suit the size and weight of materials to be accommodated. Floor and vertical space was wasted, provision of proper lighting diffi-



*Store at York before modernisation*

cult, and it was almost impossible in the worst cases to present a clean and tidy appearance. Now, modern steel shelving with dividers and drawers is being provided designed to hold compactly the stocks at present carried, and capable of being adjusted with ease to meet changes in the materials to be housed.

#### Difficulties of alteration

No matter what form improvements and modernisation take, inevitably alterations to existing premises will be involved. Most railway stores premises were built long ago, and were not intended for use by contemporary storage and movement equipment. Floors are often uneven and sometimes not made up, and have to be renewed to stand up to the stresses of manoeuvring trucks and the weight of tiered pallets; doors require heightening, and good lighting and heating has to be provided, for existing facilities are often negligible. Roof supports frequently restrict movement and modify optimum storage layouts until the roof is altered, and limited road and rail access have often to be accepted.

It may be of interest beyond this general survey of the ways in which modernisation of the stores is proceeding to give short details of each major depot where improvements have been effected or are at present planned.

Darlington (North Road) is the major locomotive supplies depot in the Region, and it has been most affected by the

change in traction. The stores are at present congested because diesel material for new building and servicing have to be housed as well as spares for the steam locomotives still remaining. In 1952 standard wood racking was installed and floor space conserved, and these improvements have helped in meeting the immediate pressure on accommodation. Now proposals are being developed for the conversion of a large machine shop into a store equipped with modern shelving, pallets, and pallet racking, for all diesel materials, including engines. The scope for mechanical handling all locomotive material is not large, but oil in drums, diesel engines, swarf and non-ferrous scrap are already palletised.

#### Gateshead traffic stores

The modern racking installed in the Traffic Stores at Gateshead is illustrated. By the introduction of this racking, and pallets where appropriate, it became possible to accommodate in the one building, in addition to the existing Traffic Stores for the northern part of the Region, the corresponding stores for the remainder of the Region formerly supplied from Peterborough, the electrical stores previously housed in poor accommodation elsewhere in Gateshead, and the signalling material for the Tyneside area until recently housed at York.

Although Walkergate is one of the smaller stores it is noteworthy because it deals with steam, electric, and diesel coaching stock as well as wagons, thus necessitating the holding of a wide range of commodities. Here, modern shelving has been installed on both floors of the general stores building; pallets of various types have been provided for wagon components, and pallet racking erected

to house flat pallets holding bolts and nuts. Reductions in handling costs have been made, and storage accommodation released for other purposes.

#### Shildon wagon stores

At Shildon a method-study investigation into the stores revealed that it was both practicable and much more efficient to concentrate the major portion of general stores and wagon components in an existing large store, centrally sited, instead of in several buildings scattered throughout the works. Proposals to this end have been formulated, and include the provision of double-tier shelving and a reach truck to operate solely within the store, leaving the existing general-purpose fork-lift truck to serve the remainder of the stores. Good progress has already been made with the palletisation of wagon components in the central store, as will be seen from the illustration, whilst an even greater percentage of palletised stocks will be secured following the provision of pallet racking for nuts, bolts, and rivets, etc. The roof of part of the store is being renewed as a clear span, thereby removing columns which impede pallet stacking, and giving increased storage area and manoeuvrability of mechanical equipment. The proposed concentration will substantially reduce transportation within the works area, and increase savings already secured by the provision of mechanised handling equipment.

A method-study investigation into the Carriage Works Store at York (Holgate) has been made, with the object of providing modern storage and handling equipment. The proposals are now being developed but meantime the palletisation of suitable stocks has commenced.

*Continued on page 340*



*Slotted angle racking in the modernised store at Gateshead*



## POWER-SIGNALLING INSTALLATION at Edge Hill

THE opening, during the week-end of August 27, of the new power signalbox at Edge Hill marked the latest stage of the Liverpool-Crewe-Stafford resignalling. Already, colour-light signals and full track-circuiting have been installed from Liverpool Lime Street to Whitmore, several miles south of Crewe. Further extensions southward will be made during the autumn.

The lines serving Edge Hill marshalling yard and its subsidiary yards are extremely complex: in some places, they are on three different levels. The small diagram on page 333 shows these connections in a simplified and very general form. Lines from Edge Hill run to Liverpool Lime Street Station; through Waterloo Tunnel to the Docks; to Park Gate and then through Wapping Tunnel, again to the Docks. In other directions they run to Runcorn, Chester, and Crewe; to Manchester and the East; and to Alexandra Docks and Bootle, to the North.

To provide greater flexibility and minimise the need to cross trains at Edge Hill, the lines from there into Lime Street Station have been transposed from Down, Down, Up, Up to Down, Up, Down, Up. This arrangement conforms with that of the lines running eastward from Edge Hill to Huyton in the Manchester direction. It has also been necessary to lower the track between Edge Hill and Lime Street to provide the headroom needed for the overhead 25 kV. electrification. At the west end of Edge Hill Station, the track was lowered by as much as 18 in. This, in turn, necessitated the shortening of the station platforms at the west end and an equivalent lengthening at the east end.

### Fringe boxes

The whole area was too extensive and complex for control from one new signalbox in the time available. Instead, three mechanical signalboxes near Edge Hill Station, and Wavertree Junction box on the Crewe line were replaced by a power signalbox with a route-relay interlocking and miniature control panel of the pushbutton type. In addition to building and equipping of the signalbox, much work, including alterations in the layout of the track, had to be done at ten "fringe" boxes extending to Huyton in the east.

The consequent "commissioning programme" was spread over four weeks. Huyton Station signalbox with its signalling and junctions—the first to come in

### Latest stage of Liverpool-Crewe-Stafford resignalling completed by opening of power signalbox

operation—was ready during the week-end of July 30. The commissioning of the box at Edge Hill marked the completion of the programme.

Over the whole of the area four-aspect colour-light signals are provided with junction indicators and position-light subsidiary signals. These, and the position-light ground signals, are of standard type. All points are operated by electro-pneumatic point machines. In all, there are 81 running signals, 29 position-light ground signals, and 85 power-operated points.

### Track circuits

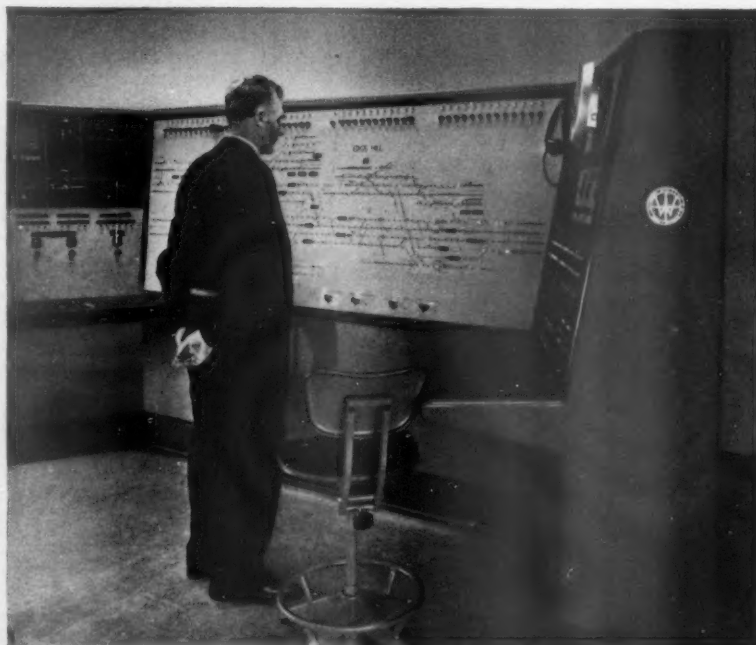
The area contains 192 track circuits. To ensure immunity from 25-kV. 50-cycle a.c. traction effects, all track circuits are of the single-rail d.c. type. To prevent a reduction in train shunt resulting from excessive 50-cycle voltage across the rails, chokes have been provided in the relay leads. Detector equipment disconnects the track feed if rail-to-rail voltage rises to a value at which the train shunt might be impaired.

In the relay room, all relays connected to line circuits are rendered immune against superimposed 50-cycle a.c. to a maximum of 1,000 V. without impairing their d.c. characteristics.

### Effect on other boxes

New track-circuiting and some colour-light signals have been installed at the fringe boxes. The lever frame in Exhibition Junction signalbox has been renewed. Block working has been abolished in all directions at the new signalbox at Edge Hill and replaced by train describers.

The box is on the south side of the line. On the ground floor there are the relay room and workshops. Above these is the operating room, and behind it the messroom, kitchen, and lavatories. The signalmen work with their backs to the line. In front of the panel, which is on the side away from the line, is the Regulator's desk with the telephone concentrator. Power supply for signalling purposes is taken at the track-section cabin between the Fast and Slow lines about 350



Control panel in operating room of new signalbox

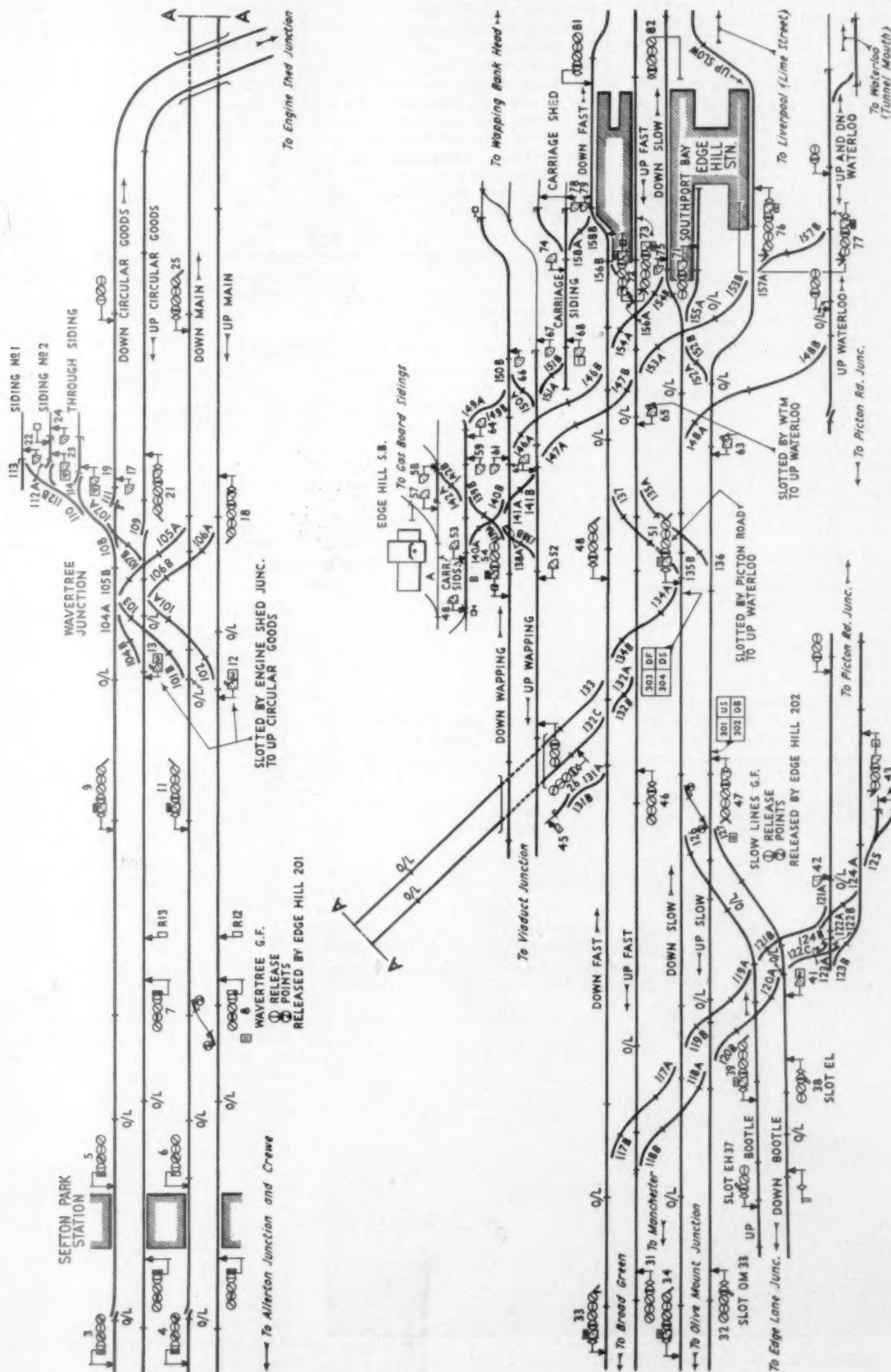


Diagram of lines controlled from Liverpool Edge Hill signalbox on the London Midland Region of British Railways

yd. east of the signalbox. The track-section cabin also accommodates the main signalling switchboard and air compressors.

#### The panel

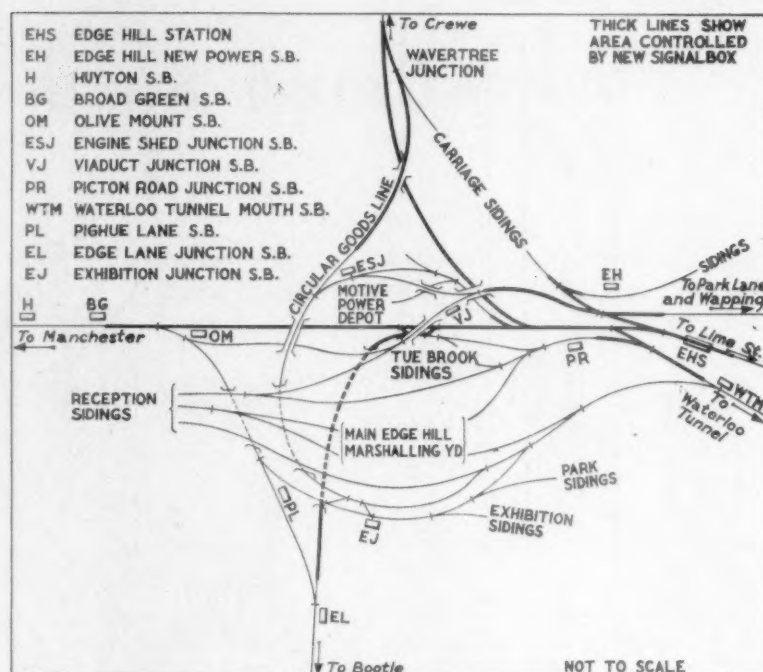
The main panel is about 8 ft. long x 3 ft. deep. It is slightly inclined from the vertical. Each side carries two wing panels which approach the main panel at an angle.

Indications and controls are much the same as those on Weaver Junction panel, described in *The Railway Gazette* of April 28, 1961.

The train describers are of the all-relay pattern using Post Office 3,000-type relays. Apart from the describers between Edge Hill and Viaduct Junction, British Railways four-digit alpha-numerical code of train identification is used.

At Edge Hill, a description appears initially on the diagram as the train approaches the first signal and is then stepped forward automatically from signal to signal. Provided that the signals have been cleared, the description is automatically transmitted to the next box. There the description is cleared out automatically when the train passes the first stop signal controlled by that box.

Some Up trains are "banked" up the gradient leading from Lime Street Station to Edge Hill—either to Edge Hill Station or, in the case of trains travelling in the Crewe direction, to just beyond the junction at Wavertree. A special indication informs the Edge Hill signalman that a train is being banked. This takes the form of a red floodlight behind the first digit of the alpha-numerical code. It is



Connections between Edge Hill and subsidiary marshalling yards

stepped forward with the code description until the train passes Signals 73 or 76 (if proceeding on the Manchester lines) or Signals 7 or 8 (if proceeding toward Allerton Junction and Crewe).

#### Simplified train describers

Between Edge Hill and Viaduct Junction, where train movements are local,

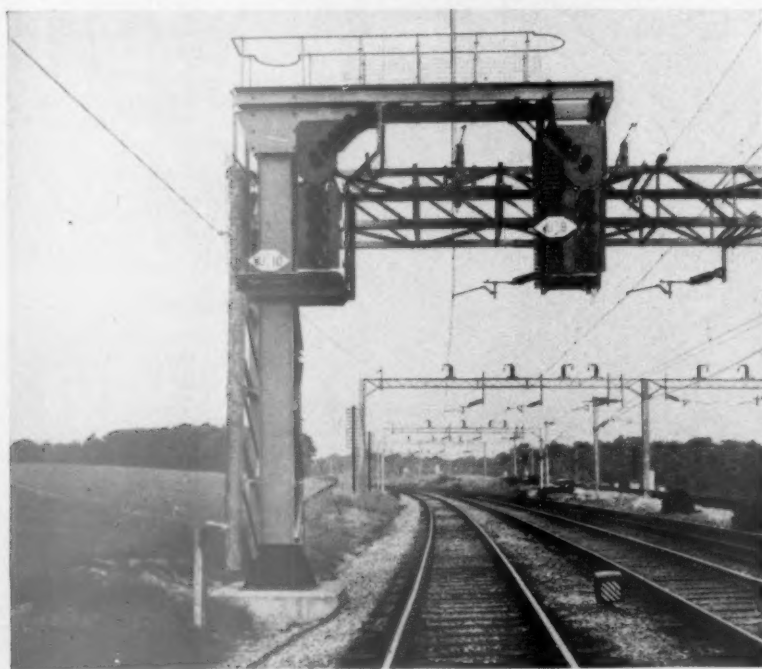
the standard alpha-numerical code cannot be used. Instead, a simplified form of train describer gives actual train descriptions (with corresponding block-bell codes) and destinations. The transmission and clear-out of descriptions is done manually.

Train descriptions to Edge Lane and Engine Shed Junction are also transmitted manually, but special transfer buttons at Edge Hill enable the description of trains approaching Signals 6 and 8 and proceeding along the circular goods line to be transmitted direct to Engine Shed Junction. This arrangement has now made it unnecessary to set-up and transmit the train description separately.

#### Describer indicators

The indicators used at the fringe boxes are of the "optical projection" type, displaying  $\frac{1}{2}$  in. characters. At Edge Hill box space restrictions on the panel necessitated a "miniaturised" indicator displaying  $\frac{1}{4}$  in. characters. This is of the "edge-lit" Perspex type designed, together with its electrical connections, as a complete plug-in unit.

Train descriptions can be interposed or cancelled at any signal position where a train movement can originate. On the right-hand panel are two main sets of buttons. The first set, lettered from A to Z and from zero to 9, is for setting up descriptions of trains to be interposed. The second set, comprising "interpose" and "cancel" buttons, bears the number of the signals where a train can be interposed or cancelled.



Colour-light signal for high-speed junctions on a.c. electrified lines



The right-hand panel also has description and destination buttons for trains to Viaduct Junction, and the indicators for trains coming from that box. On the left-hand panel are buttons working to Allerton Junction beyond Wavertree (fast and slow lines); Broad Green (fast lines only); Olive Mount (slow lines only); this box does not control fast lines, and Edge Lane. For each line there is a "receive cancel" and "transmit cancel" button. Corresponding buttons are in these boxes, and the signalmen at each end of the section must press their buttons simultaneously (one "receive" and the other "transmit") before the description of a train can be cancelled.

For the short distance between Edge Hill and Viaduct Junction a "direct-wire" type of equipment was found most economical. Otherwise, descriptions are transmitted between signalboxes by codes, requiring only one pair of line wires per transmitter/receiver link.

#### Telecommunications

On the regulator's desk in the box at Edge Hill are three identically equipped 48-line telephone keyboards—one each for the regulator, booking-boy, and signalmen. These boards are connected to circuits to stations and other signalboxes in the area and to the traffic and electric control rooms at Crewe and Liverpool. Maintenance telephone circuits provide links with lineside locations, relay rooms, and other points associated with the signalling.

A staff-paging control panel is also mounted on the regulator's desk to enable him to call maintenance personnel to the telephone nearest to its place of work.

An 100-line automatic telephone exchange in the signalbox provides communication with all necessary points in the marshalling yard. These telephone circuits have been converted from battery-code ringing to dial selective operation, using equipment designed to respond to a.c. signalling impulses.

Electric-impulse clocks have been installed in all signalboxes, stations and depots in the Edge Hill area. These are controlled by a master clock in the power signalbox.

Cables are laid in lineside troughs. The telecommunications cables also cater for traction supervisory control circuits and the longer signalling circuits as well as those for administrative traffic control and electrification telephone.

In general, two cables are provided. Interference from traction current is prevented by an aluminium sheath, double steel-tape armouring, and a high-grade protective outer covering. The sheath and armour tapes are earthed at 1,000-yd. intervals.

One of the cables contains 27 quads of paper-insulated 40-lb. per mile copper conductors. It mainly serves lineside

telephones, standby supervisory control circuits and certain signalling circuits.

The other cable is of the "composite" type. It has an inner core comprising two polythene-insulated carrier quads with 0.056-in. copper conductors, laid up with two small-diameter (0.163 in.) co-axial cores and four 10-lb. per mile polythene-insulated quads for co-axial system control purposes. This core is surrounded by 37 quads of paper-insulated 40-lb. per mile copper conductors serving the main supervisory control circuits and long-distance telephone circuits. The carrier quads cater for a total of four 12-circuit carrier telephone systems, of which two are being used initially to provide trunk circuits from Liverpool to Crewe and beyond. The two co-axial cores and control quads provide for the ultimate expansion of the trunk network necessary for an inter-regional trunk dialling scheme.

The relay room in Edge Hill Signalbox contains three rows of racks. The relays for time releases and non-correspondence ("flasher") point indications are standard size. Otherwise, all relays are of the miniature plug-in type. They have "spade" connections, so that all connections can be made to the relay base, before the relay is plugged in. Nearly all are 50-V. d.c. relays.

The control of points and signals near Wavertree Junction is concentrated in a satellite relay interlocking, complete with signal, point, and track-circuit control, indication and interlocking circuits, and remotely controlled from Edge Hill.

As the interlocking is less than a mile from the parent box, conventional line relays and line circuits are used.

#### Electric power supply

The main power equipment, both electric and pneumatic, is in the track-sectioning cabin 350 yd. east of the new signalbox. Normal supply is 415-V. three-phase taken from the local Electricity Authority. A 415-650-V. transformer is connected between two phases to give the normal 650-V. single-phase signalling supply. The air compressors take 415-V. three-phase current.

When the electrification scheme comes into operation, the standby source of supply will be derived from the 25-kV. traction current by suitable transformation. As the current is single-phase, Westinghouse static-phase converters are used to yield the three-phase supply for the compressors. The changeover from normal to traction standby supply will be made automatically by voltage-detection circuits operating a changeover contactor. These will operate automatically the moment normal supply fails. Changeover will take less than 10 sec.

Until the traction supply becomes available, standby supply will be provided by two transportable diesel alternator sets—one of 50 kVA for signalling, and

one of 75 kVA. for the compressors. These again will operate automatically and take over in less than 10 sec.

The 650-V. single-phase signalling supply is distributed from the track-sectioning cabin through two ring mains and two feeders. One ring main supplies locations on the Manchester line, with a spur to Olive Mount and Broad Green boxes, and another to Edge Lane box. The second ring main supplies locations on the Liverpool lines, and also Edge Hill, Picton Road, and Waterloo Tunnel Mouth boxes. One feeder goes down the Crewe line towards Speke beyond Wavertree and Allerton Junctions and butts up to the north feeder from Speke Feeder Station. The other goes to Exhibition Junction and Pighue Lane boxes.

At Edge Hill, the relay room contains a small cubicle-type distribution switchboard for switching the 650/110-V. transformer and distributing the low-voltage signalling supplies within the box. Means are provided at each signalbox and lineside location to enable the power cable to be "sectionalised."

#### Air compressors

The duplicate air compressors in the track-sectioning cabin are Broomwade Type EH660, delivering 95 cu. ft. of free air per min. at a pressure of 125 lb. per sq. in. Air is distributed to the point machines through two ring mains and a spur. One main covers the station area and the other the Manchester lines. The spur, fed through a non-return valve, goes to Wavertree Junction, where there are duplicate low-pressure receivers. The air main is a 2-in. dia. polythene pipe, and ½-in. dia. connections are taken off them to the point valves.

The work was planned and the specifications prepared under the direction of Mr. E. G. Brentnall, Chief Signal & Telecommunications Engineer, London Midland Region, and was carried out to his requirements under the immediate supervision of Mr. F. W. Young, Assistant to Signal & Telecommunications Engineer (Electrification).

The principal contractors for power signalling and associated telecommunications work at Edge Hill were as follow:—

Westinghouse Brake & Signal Co. Ltd.	Main signalling contractor for supply and installation contract for power signalling, including panel, signals, e.p. point machines, and track circuits
Standard Telephones & Cables Limited	Train describers and signal-post telephones
British Insulated Cables Limited	Supply and installation of telecommunications cables
Automatic Telephone & Electric Co. Ltd.	Regulator's desk, 100-line automatic telephone exchange, dial selective telephone equipment
Tannoy Products Limited	Staff-call loudspeaker equipment
Synchromo Co. Ltd. (Electrical Engineers) Limited	Electric clock system Installation of telecommunications equipment

# INTERNATIONAL UNION OF RAILWAYS: its functions and organisation

THE board of management of the International Union of Railways (U.I.C.) is to hold its 60th session in London on September 26, 1961, under the Chairmanship of Mr. John Ratter, Member of the British Transport Commission. Mr. Ratter will hold the Chairmanship of the U.I.C. until December 31, 1962. The Secretary-General of the U.I.C. is Mr. Louis Armand, Hon. Chairman of the board of the French National Railway Company.

The main questions on the agenda for the London meeting are given below:—

Construction of a building in Paris for the offices of the U.I.C. General Secretariat;

Examination of the work of the committees;

Results of the meetings of heads of departments;

Publication and distribution of the report on "The Economic problems of the railways of member countries of the European Conference of Ministers of Transport";

Development of U.I.C. information services;

Report on international railway activities;

Automatic coupling.

This will be the first time that the U.I.C. board of management has met in Great Britain.

In 1956 the board requested the Special Committee on Automatic Coupling to resume the study of the problem in association with the Office for Research &

Experiments (O.R.E.).

The committee decided that, while continuing the compilation of accident statistics, it should assess the actual savings which could be directly attributable to automatic coupling; finalise a type of coupling well adapted to the characteristics of European railway traffic, and examine legal and financial aspects.

An initial estimate led the committee to conclude that the only economically sound solution enabling all European rolling-stock to be equipped with automatic coupling would entail a simple traction coupling, a system which would not involve extensive modification of vehicle chassis. Many administrations held the view that this solution was not completely satisfactory and that provision should be made for the adoption of a full shock and traction coupling. This would mean that, while rolling-stock would no longer be fitted with side buffers it would nevertheless have to withstand axial compression efforts.

## Conversion difficulties

The problem of changing over from screw coupling to automatic coupling also raises difficulties. It must be decided whether conversion should be effected quickly by practically halting all traffic after long preparatory work or whether provision was to be made for the conversion to be carried out progressively in stages which would entail the joint use of automatic and screw couplings and might expose shunters to greater risks during the transition period.

The committee believed that the reply to all these questions would depend on the characteristics of the couplings likely to be chosen and the associated economic factors. In consequence, specifications included the obligation to submit proposals for prototypes with the following variants:—

(i) An automatic traction coupling which can be coupled to the screw coupling;

(ii) An automatic traction coupling which cannot be coupled to the screw coupling;

(iii) An automatic shock and traction coupling which can be coupled to the screw coupling;

(iv) An automatic shock and traction

coupling which cannot be coupled to the screw coupling.

All variants included automatic coupling of air-brake pipes, low-tension electric circuits and, if possible, steam-heating pipes.

Calls for technical tenders, based on these specifications, were sent out on May 1, 1960, and subsequent proposals are in course of examination.

The Organisation for the Collaboration of Railways (O.S.J.D.) (the railway networks in Eastern European countries, the U.S.S.R., the Socialist Republics of China, Mongolia, Vietnam and Korea are members of the O.S.J.D.) is also dealing with the problem of automatic coupling and working along the same lines as the U.I.C. It has drawn up specifications very similar to those of the U.I.C. but in which it is stipulated that it must be possible to connect the automatic coupling straight on to the U.S.S.R. Railways SA3 coupler without an intermediate link.

In view of the fact that the SA 3 coupler is a full shock and traction device, the O.S.J.D. must also study a shock and traction coupling. The SA 3 coupler cannot be adopted as it stands because it does not provide for the automatic coupling of the air-brake pipe and the electric circuits; furthermore, it is rather



Mr. J. Ratter, Chairman of U.I.C. until December 31, 1962



Mr. J. L. Harrington, British Railways representative on the U.I.C. Board

large having regard to the dimensions of normal-gauge rolling stock.

In view of these circumstances, it has been decided that the U.I.C. and the O.S.J.D. shall work in close collaboration on this problem.

#### Economic problems of the railways

The financial situation of the railways has been a cause of concern in many countries for some years. Since 1951 the U.I.C. has been studying this problem more or less continuously. In the course of this work, and with the assistance of its 6th Committee, the U.I.C. has progressively acquired special qualifications enabling it to give an objective opinion.

In February, 1951, the U.I.C. set forth the causes to which the railways attributed financial difficulties and advocated measures designed to put railway finances on a sound footing. In 1956, at the request of the E.C.M.T., the U.I.C. submitted a memorandum on the subject. This motivated a resolution of the Council of Ministers on May 16, 1957. It was in this memorandum that the U.I.C. discussed the operation known as the "normalisation of accounts" which was favourably viewed by governments and which enabled significant improvements to be made in railway operating balance sheets.

A further request made by the E.C.M.T. on May 24, 1960, for the U.I.C. to continue and enlarge on its previous study gave the chance to recall the need for laying down a general transport policy. A memorandum was published in July, 1961, entitled "The economic problems of the railways of member countries of the European Conference of Ministers of Transport."

This report recommended measures under two headings: those which concerned only the railways, and those which, beyond the sphere of the railways themselves, tended to improve the organisation of transport as a whole.

Referring in detail to the views held by the railways, the report stressed that the railway of the future should so far as possible be allowed to act like an industrial or commercial undertaking, to enjoy considerable independence of management, and to be in a position to ensure financial equilibrium. Such conditions, already largely achieved on certain networks, depended on the support of the public authorities.

The report pointed out that neither the measures confined solely to the railways, nor those which could be introduced in other forms of transport would be sufficient in themselves to achieve a state of affairs in which the division of traffic between different means of transport would be rational. The inter-penetration of various means of transport made any solution of a partial nature unacceptable and the question would have to be dealt with on a higher level

so as to arrive at an "optimum transport system"

The networks consider that competition must be the governing factor. They feel that competition should be subject to certain preliminary conditions because complete freedom cannot be envisaged in this field in view of the nature of transport and its consequences.

To achieve "healthy competition," three things are required, namely:

i. None of the means of transport should possess advantages, or be subject to any burdens and obligations, other than those which are peculiar to it; this preliminary condition is often referred to as "the equality of basic conditions."

ii. The user should be free to exercise his own choice in regard to rates and fares which are based on the actual costs and the market position and ensure the overall financial balance of each undertaking.

iii. The public interest should not be ignored.

Co-operation between the different means of transport within the framework of "technical co-ordination" is not excluded.

While favouring a general atmosphere of competition between the different forms of transport, the report stressed "the necessity of government intervention," without which it is felt that the indispensable respect of good order and satisfaction for the user cannot be obtained. With regard to the choice and use of the methods of intervention, some moderation was recommended so that the two dangers of "laissez-faire" and the introduction of purely authoritarian measures could be avoided.

#### Development of services

The facilities established in 1950 by the creation of the International Railway Documentation Bureau to collect and distribute information of interest meet only the requirements of its European member administrations. To meet the needs of railway networks throughout the world it is necessary for the U.I.C. to undertake the task of acting similarly for them.

The role of the forum would not be limited to technical problems connected with railway operating, rolling-stock and permanent way. It should also include questions of an economic nature (costs, co-ordination, rentability of investments,

etc.) as well as of a commercial nature (commercial and tariff structure policies) and questions relating to the training of staff, particularly to supervisory staff.

Through the medium of large meetings held at regular intervals and the publication of its bulletins, the International Railway Congress Association (I.R.C.A.) plays an important role in the pooling of experience gained in railway matters throughout the world.

#### Functions of board

The U.I.C. board of management comprises senior officials of the 14 European administrations tabulated at the foot of this column.

The board of management, which usually holds four meetings each year, is responsible for the administration of the union, takes decisions of general application, and gives directives to the U.I.C. study bodies for the drawing-up and execution of their programmes. The board thus ensures continuity of U.I.C. action. It also decides the conditions covering the representation of the U.I.C. on outside bodies, more particularly at meetings of Governmental organisations.

It may be of interest to give an outline of the U.I.C., its organisation and activities.

The main international organisations are the Conference for the Technical Unity of Railways; the International Wagon Union; the International Carriage & Brake Van Union; the European Timetable Conference; the European Goods Train Timetable Conference; the International Rail Transport Committee; the International Railway Congress Association; and the International Union of Railways.

Apart from questions relative to the constructional and maintenance conditions to be fulfilled by vehicles when crossing frontiers, the exchange of rolling-stock gives rise to operating and financial problems such as the return of empty vehicles, breakdown repairs, and the settlement of the mutual facilities provided by the railway administrations.

Two international unions for the exchange of rolling-stock were set up after the 1870 war but, as this dual system was not fully satisfactory, the Italian Railways took the initiative in 1921 of setting up the International Wagon Union which laid down the regulations governing the reciprocal use of wagons, currently known

Administration	Usual representation on the board of management
Austria ... ..	Dr. M. Schantl, General Manager, Austrian Federal Railways
Belgium ... ..	Mr. De Vos, General Manager, Belgian National Railway
Czechoslovakia ... ..	Mr. Pospisil, Vice-Minister of Transport & Telecommunications, Czechoslovak Socialist Republic
France ... ..	Mr. P. Dargeou, General Manager, French National Railways
Germany (D.B.) ... ..	Prof. Dr. H. M. Oefftering, Senior Chairman, German Federal Railway
Germany (D.R.) ... ..	Mr. Scholz, Vice-Minister, German State Railways
Great Britain ... ..	Mr. J. L. Harrington, Chief Shipping & International Services Officer, B.T.C.
Hungary ... ..	Mr. J. Nemeth, Vice-Minister & General Manager, Hungarian State Railways
Italy ... ..	Mr. S. Rissone, General Manager, Italian State Railways
Netherlands ... ..	Mr. J. Lohmann, Chairman, Netherlands Railways
Poland ... ..	Mr. Tarantowicz, Under-Secretary of State, Ministry of Communications
Portugal ... ..	Eng. R. de Espregueira Mendes, General Manager, Portuguese Railways
Sweden ... ..	Mr. E. G. J. Upmark, General Manager, Swedish State Railways
Switzerland (C.F.F.) ... ..	Dr. H. Gschwind, Chairman, Swiss Federal Railways



as the R.I.V. Regulations. These, amended and enlarged, are still in force.

An International Carriage & Brake Van Union was constituted along similar lines, its purpose being to regulate the reciprocal use of passenger rolling-stock in international traffic by R.I.C. Regulations, the current edition of which dates from January 1, 1955.

The railway administrations also paid special attention to the question of timetables.

The necessity of providing fast services between principal cities gave rise, as early as 1872, to the meeting of a Timetable Conference, the purpose of which was to establish train connections at main junction points on each side of frontiers. Through services developed so rapidly that a Through Carriage Conference was set up within the framework of the International Carriage & Brake Van Union to determine the formation of international trains, decide for each important international service the number and type of carriages supplied by each administration taking part in the service, and to lay down the length of time each carriage was to be placed in service to balance the mileage account.

These two closely connected conferences bring together each year European railway experts. In the field of goods transport, the European Goods Trains Timetable Conference, usually known as the L.I.M. Conference (Goods Trains Timetable Booklet), has regulated goods trains connections since 1924.

The basis for collaboration between railways for the comparison of methods and solutions was laid in 1885 by the formation of the International Railway Congress Association (I.R.C.A.), the purpose of which is to promote railway progress by periodical congresses and publications and, in particular, by a monthly bulletin.

The ever-increasing development of international railway collaboration led to the setting up in 1922 of the International Union of Railways (U.I.C.) which, according to its statutes, ensures the standardisation and improvement of the equipment and operating methods of the railways with a view to international traffic.

#### Role of the U.I.C.

The situation of the transport industry was critical immediately after the 1939-45 war.

The growing competition between the various forms of transport and the greater importance of transport in general state economy soon led Governments to deal themselves with transport problems through the international inter-governmental organisations. These included the European Central Inland Transport Organisation (E.C.I.T.O.), which operated from 1944 to 1947; the Inland Transport Committee of the United Nations Eco-

nomic Commission for Europe; the European Conference of Ministers of Transport (E.C.M.T.); the European Coal & Steel Community (E.C.S.C.), and the European Economic Community (Common Market). Close contacts are maintained by the U.I.C. with all these bodies.

In 1951, the specialised organisations such as the Wagon Union, Carriage & Brake Van Union, the International Rail Transport Committee, the Goods Trains Timetable Conference, and the more recently created International Union of European Railway Road Services (U.R.F.), concluded an agreement with the U.I.C. entrusting it with the task of ensuring co-ordination and unity of action and of representing railway interests under the aegis of the General Managers of administrations.

These developments have resulted in the following action:—

(i) The setting-up within the U.I.C. of offices and bureaux which, while forming an integral part of the U.I.C., are granted a considerable degree of autonomy and have their own managing bodies: the Office for Research & Experiments (O.R.E.), the Information & Publicity Centre of the European Railways (C.I.P.C.E.), the International Documentation Bureau (B.D.C.), and the International Railway Film Bureau (B.F.C.).

(ii) The setting-up, in accordance with the amended statutes of the U.I.C., of restricted groups to examine international problems of a specific or localised nature. The networks have undertaken the joint study of such problems and have invested the U.I.C. with authority to deal with all questions of "limited application" of some importance, regardless of the number of administrations concerned. This very flexible formula has proved particularly satisfactory and has prevented the railways from reverting to the system of bilateral agreements.

International co-operation also led to the setting-up of the following organisations:—

#### EUROP Wagon Pool

The Europ wagon pool, which was set up in 1953, has made it possible for the nine member administrations to operate some 200,000 wagons on a common user basis. This pool has also given added importance to the standardisation of wagons which was carried out successfully by the Office for Research & Experiments.

#### EUROFIMA

The European Company for the financing of railway rolling-stock was established in 1955. Its objects are to arrange for the manufacture of rolling-stock of standard type or performance either on its own behalf or on behalf of the railway administrations or bodies concerned. This method of financing was particularly opportune at a time when the majority of European administrations

was faced with the modernisation of motive power and rolling-stock.

#### INTERFRIGO

The International Railway-owned Company for Refrigerated Transport (Interfrigo) was created in 1949 to develop the international transport of perishable traffic at controlled temperatures. Apart from administering members' refrigerated rolling-stock in international traffic, the company owns or is in course of acquiring 2,185 wagons.

#### EUROPABUS

Europabus was set up in 1951 under the aegis of the Union of European Railway Road Services (U.R.F.) operating an international network of tourist services by motorcoach; it runs 70 regular services and 30 tourist tours operated by the railways on their subsidiary organisations with the co-operation of private undertakings.

#### TRANS-EUROP EXPRESS

The Trans-Europ Express was created in 1957 to organise and operate fast services between major European cities with modern rolling-stock of a similar type and at timings suitable for business journeys.

#### Organisation of the U.I.C.

The higher authorities of the U.I.C. are the general assembly and the board of management.

The general assembly is made up of all member administrations. Each administration is granted a number of votes proportional to the number of kilometres of line it operates.

Meeting once a year, the general assembly decides amendments to be made to statutes and approves the regulations of offices, bureaux and centres. It appoints, for a period of two years, the Chairman administration of the U.I.C. as well as the countries which are to sit on the board of management and decides on the admission of members or associate members. On the proposal of the board of management, the general assembly takes decisions concerning the duties of organisations which are parties to the 1951 agreement, as well as decisions concerning questions. It also approves the accounts of the union.

In December, 1960, meetings of heads of departments were instituted to provide the board of management with advisory bodies, develop contacts between senior officials, and facilitate the mutual exchange of information.

These meetings are authorised to act on their own initiative and are designed to facilitate the co-ordination of all international railway activities. They pay special attention to the programmes of work of the U.I.C. bodies as well as those of all organisations participating in international railway work. They also examine all questions submitted to them by the board. Technical displays and visits to supplement the exchange of infor-

mation are arranged by the meetings.

Eight specialised committees constitute the basic study bodies of the U.I.C.

The 1st Committee, "Passenger Traffic," is under the chairmanship of Mr. G. M. Leach, International Traffic Officer, British Transport Commission.

Among its achievements have been the reduction in the number of carriage classes to two, which came in operation in 1956, and the compilation of a joint international tariff which incorporates and systematises the conditions of all ordinary international tariffs.

#### Study of passenger traffic

The committee has also made a study on the future of passenger traffic, and has drawn up a report giving proposals and suggestions concerning timetables and the formation of international trains, the crossing of frontiers, and increased sleeping accommodation. Studies in hand include the standardisation of European railway administrations, passenger and baggage tariffs, the standardisation of systems of seat reservation in international trains, the development of train car services, and the study of problems raised by the development of motorcar and air traffic and competition from motorcoach services.

The 2nd Committee, "Goods Traffic," is presided over by Dr. H. Dirlewanger, Chief Freight Traffic Officer, Swiss Federal Railways.

This committee aims essentially at standardisation and simplification. European tariffs for the conveyance of part loads and for the conveyance of express parcels have been devised, Europe being considered as a territorial entity divided into price zones. The majority of the networks has concluded an agreement for tariff collaboration which is designed to end useless competition for international traffic. Studies are being made into the general standardisation of railway tariffs, the preparation of an international transit tariff, and the compilation of a standard nomenclature of goods.

The 3rd Committee, "Finance, Accountancy, Statistics" is presided over by Mr. Desorgher, Honorary Deputy General Manager of the Belgian National Railways.

Its work is to achieve through standardisation a progressive improvement in accountancy systems and methods of compiling statistics and calculating costs on the basis of general principles currently accepted. Its work also includes the study of the use of mechanical and electronic data processing equipment.

The 4th Committee, "Operating," is presided over by Mr. Cirillo, Deputy General Manager, Italian State Railways. Its role is to establish a coherent programme for the rationalisation of international railway traffic. In the field of passenger traffic, it has undertaken a

general study on measures to be taken to facilitate rail travel.

So far as goods traffic is concerned, problems dealt with cover not only the usage and forwarding of rolling-stock, but also the study of types of rolling-stock best adapted to customers' and economic requirements; modernisation of international goods train running, improved wagon turn-round, uniform marking of wagons to facilitate allocation, the speeding-up of frontier formalities, the determination of policy on special wagons, the drafting of transport regulations for privately-owned wagons, installations at marshalling yards and handling equipment, and improved door-to-door services. In the latter field, the U.I.C. has carried out study on the standardisation of containers, an international pool, and the conveyance of road vehicles on wagons.

The 5th Committee, "Motive Power and Rolling-Stock" is under the Chairmanship of Mr. C. Martin, Head of the S.N.C.F. Motive Power & Rolling Stock Department. This committee is entrusted with the preparation of regulations and specifications for the unification of railway motive power and rolling stock. Studies on passenger rolling-stock already have resulted in the determination of unified types of carriages for the various U.I.C. member networks.

#### Standardisation of motive power

In the field of motive power, standard rules have been laid down for electric traction motors as well as for the technical conditions covering the acceptance of diesel engines. Regulations have been designed to enable diesel or electric locomotives, motor coaches, and railcars to be used on common services, as well as specifications covering various parts used in the construction of motive-power stock, technical regulations covering through working, and visual and audible signals for motive power units. Studies in hand cover the application of electronics to control and protective equipment on electric locomotives and railcars, standardisation of axle bearings, and braking problems arising as a result of increased loads and speeds of trains running in international services.

The 6th Committee, "General Studies", is presided over by Dr. Hennig, Ministerialdirigent, Deutsche Bundesbahn. During the last few years, this committee has produced several economic studies of special importance. In July, 1961, a report was drawn up and published at the request of the European Conference of Ministers of Transport (E.C.M.T.) and entitled "The economic problems of the Railways of E.C.M.T. Member Countries." This assessed the present situation of European railways and broadly outlined a future policy.

Studies include the place of the railway in transport economy, the repercussions

of general economic developments on transport, competition from other forms of transport, the obligations imposed on networks, relations with Governments, and co-ordination of investments.

#### Fixed installations

The 7th Committee, "Way & Works" is presided over by Mr. Lichtenfeld, Leiter des Technischen Zentralamtes, Deutsche Reichsbahn. This committee studies all questions relative to fixed installations. The U.I.C. has already undertaken detailed study on the causes of track wear, reaction of the track to the passage of trains, modern marshalling yard equipment, and the principles of a standard signalling system of the future. Obligatory specifications have been adopted for the supply of rails, the profiles of which have been standardised, concrete sleepers and sleeper-screws. The present programme of the 7th Committee includes a number of questions concerning track and structures as well as signalling and telecommunications.

The 8th Committee, "Legal Questions" is presided over by Mr. E. Jarisch, Ministerialrat, Head of the Rechtsdienstes der Österreichischen Bundesbahn. This recently created committee carries out studies on the unification of regulations covering liability in the event of loss or damage, problems of arbitration and conciliation, and on the legal problems connected with rail/road crossings.

The Special Committee on Automatic Coupling is presided over by Mr. Cuttica, former Deputy General Manager of the Italian State Railways.

When certain problems require the attention of two or more committees, they are examined by a joint meeting of the committees concerned.

The U.I.C. offices, bureaux, and centres while forming part of the union, have their own statutes. These are approved by the General Assembly on the proposal of the board of management.

The Central Clearing House (B.C.C.) was set up in 1926. Its headquarters are in Brussels and it is managed by Belgian National Railways. It settles traffic debits and credits of member administrations, as well as rolling-stock and other accounts.

Utrecht is the seat of the Office for Research & Experiments (O.R.E.), which was set up in 1950 and is managed by the Netherlands Railways under the Chairmanship of Mr. J. P. Koster, General Manager of that system. It is concerned with pooling the results of research and experiments carried out and with the distribution of all necessary technical documents between its members; the use of joint research facilities; certain studies of general interest as well as the study, undertaken with a view to reducing costs, of the rationalisation of construction methods; and study of the possibility



of dividing the manufacture of equipment between the industries of various countries. The work of the office embraces all aspects of railway technology.

All U.I.C. member administrations can take part in the work of the O.R.E.

A report on O.R.E. activities is submitted each year to the U.I.C. board of management by the O.R.E. Control Committee. Appointed by the U.I.C. board of management, this committee comprises representatives of 13 administrations—including a managing administration—and the Chairmen of the U.I.C. technical committees. Its Chairman is assisted by a Manager and a bureau.

#### Information and publicity

In 1960, the Information Centre of the European Railways (C.I.C.E.) was replaced by the Information & Publicity Centre of the European Railways (C.I.P.C.E.).

C.I.P.C.E. is responsible for exchanging information about the experience gained by administrations in publicity and for analysing the scope and methods of publicity adopted by competing forms of transport, finding publicity schemes suited to the needs of the railways, and organising joint railway representation at fairs and exhibitions. In the sphere of public relations its main objectives are to make known the work and achievements of the U.I.C. to co-ordinate public relations of C.I.P.C.E. member administrations and thus to publicise joint railway policies as effectively as possible, and to publish information documents dealing with railway problems from an international standpoint.

The Publicity & Public Relations sections are each managed by a separate control committee comprising a managing administration. Mr. L. Branca,

Deputy General Manager, Italian State Railways, is at present Chairman of the Control Committee of the publicity section; the public relations section is presided over by Dr. M. Strauss, Secretary-General of the Swiss Federal Railways.

#### Documentation bureau

The International Railway Documentation Bureau (B.D.C.) was set up in 1950 with headquarters in Paris. The French Railways act as the managing administration with the assistance of an advisory technical committee. The task of this bureau is to collect and distribute to its members documents likely to be of interest to railway administrations. It publishes a monthly bulletin, the U.I.C. Documentation Bulletin, in French and Spanish.

The International Railway Film Bureau (B.F.C.) was founded in 1960. It is managed by an administration appointed by the board of management—at present French National Railways—in the person of Mr. P. Weil, Chief Public Relations & Press Officer of the S.N.C.F.

#### General Secretariat

The permanent body of the U.I.C. is the General Secretariat, through which the union is able to meet its obligations in the international sphere and to fulfil its role of co-ordinator and animator. The Secretary-General is appointed by the General Assembly on the proposal of the country in which the U.I.C. has its head office. This appointment has been held since January 1, 1961, by Mr. Louis Armand, Hon. Chairman of the S.N.C.F. board of directors, who succeeded Mr. J. Tuja, appointed Hon. Secretary-General & Adviser to the U.I.C. for two years.

The duties of the Secretary-General include attendance at the meetings of the U.I.C. higher authorities at which he acts in his secretarial capacity and, in agreement with the Chairman of the study bodies, draws up the decisions to be taken in the light of the proposals submitted by those bodies.

The more important international organisations with which the U.I.C. maintains contact include the following:—

#### Government organisations

United Nations Economic Commission for Europe; European Conference of Ministers of Transport; Central Office for International Rail Transport; Technical Unity of Railways; International Institute of Refrigeration, Organisation for the Collaboration of Railways (of the popular democracy countries), International Organisation for Standardisation.

#### Non-governmental organisations

International Chamber of Commerce; International Road Transport Union; International Union of Inland Waterways; World Tourist & Automobile Organisation; International Air Transport Association; International Union of Official Tourist Organisations; Institute of Air Transport; International Federation of Travel Agencies; International Union of Associations of Owners of Private Wagons; International Container Bureau.

The Secretary-General is assisted at U.I.C. Headquarters (10, rue de Prony, Paris, 17e) by a staff of 60, including 15 senior officials seconded to the union by the major European networks.

Constant development has made it necessary to enlarge the General Secretariat and it has been decided to erect a new building. This, now in the course of construction, will be at rue Jean Rey, not far from the Eiffel Tower.

#### Reorganising the Supplies Department of the North Eastern Region

(Concluded from page 331)

The Signalling & Telegraph Stores occupy cramped premises in widely different locations, and tentative plans for the transfer of these stores into one location with improved accommodation and equipment are being prepared.

Smaller stores than those mentioned are also being modernised as circumstances permit: for example up-to-date storage facilities are being provided at motive power depots as part of main traffic schemes introduced to provide for the substitution of diesel multiple units and diesel locomotives for steam locomotives.

Apart from the savings in handling costs and in buildings needed to house supplies, other benefits are gained from modernisation. These include: less breakages and damage because of less handling,

reduction in corrosion and obsolescence because of closer control of material and the concentration of stock in better accommodation, and saving in clerical work because the checking and recording of stocks is made easier by unit loading in pallets and racks. The provision of better equipment, including mechanisation also stimulates the interest of the staff and encourages them to keep their stores premises clean and tidy.

#### Staff conditions

Modernising the staff accommodation and amenities goes hand in hand with the improvement in stores accommodation. Better lighting and heating are an integral part of the modernisation and help the staff to carry out their duties in greater comfort, more effectively, and with less risk of accident. Other facilities are usually improved at the same time such as mess-room facilities at Walkergate and Shildon, and ambulance facilities at Walkergate.

Opportunity is being taken to offer the stores staff bonus-incentive schemes based on work study under which the greater productivity obtained is reflected in an increase in their earnings. Bonus schemes of this kind have been introduced at North Road and Stoopdale Stores, Darlington, and at Shildon. It is hoped to introduce further schemes at other stores as soon as the investigation work can be carried out.

The increasing attention now devoted to all aspects of supplies accommodation, handling, custody, and distribution, is evoking a heartening response in the stores staff. The use of modern equipment and mechanical appliances dispenses with some of the drudgery and routine inevitable in manhandling, checking, and recording thousands of similar items. It also gives improved opportunity for the display of initiative and ingenuity in carrying through the day's work, which is welcomed and appreciated by the staff.



# ELECTRIC RAILWAY TRACTION SECTION

## Adhesion experiments

FURTHER details have been published of the studies of adhesion in electric locomotives to which Monsieur F. Nouvion, Chief Engineer of the Traction and Rolling Stock Division, S.N.C.F., referred when contributing to the discussion on research at the British Railways Electrification Conference last October. It may be recalled that Monsieur Nouvion expressed the view that this subject should be considered from two angles: first, that of adhesion between wheel and rail in the true sense of the word; and second, utilisation of the adhesion, whatever its value may be. The experiments with electric sparking between the surfaces of wheel and rail to which he then referred have now progressed beyond the laboratory stage, and have taken place on a "12000" class Bo-Bo 50-cycle locomotive fitted with electrodes for treating the surfaces of the driving wheel tyres, and of the rails in front of the axle concerned. The purpose of the sparking is to destroy foreign bodies on the tyre and rail surfaces, and to remove the gas contained in the outer skin of the metal, which is another cause of reduced adhesion. A circuit for generating the sparks is illustrated in the September (English) edition of *Electric Traction on the Railways*. In order to reduce the power required, a high-tension source creates a pilot spark which provides a path by which a capacitor in a low-tension circuit can discharge through an inductance in series with the spark gaps. Laboratory tests have shown that the normal coefficient of adhesion of about 0.4 between clean metal surfaces is increased to about 1.2 immediately after sparking, while between metal surfaces which are oiled continuously the figure stabilises itself rapidly in the region of 0.6 to 0.7.

It was also emphasised by Monsieur Nouvion in connection with the second approach to the problem that the rectifier locomotive with motors connected in parallel is in itself not the complete solution to optimum use of adhesion. Both in d.c. and a.c. practice the variation of power between controller notches is important, and this aspect together with others of an electrical nature is being investigated in the current series of experiments in France. "Stepless" build-up of voltage from notch to notch has been tested on the S.N.C.F. dual-frequency Bo-Bo locomotive, No. 20104, using grid control of the rectifiers. Continuous control by this method, unsupported by tap-changing, is only practicable with low powers because of the problems of harmonics and low power factor, but the method is being used in one of the French 625 h.p. dual-frequency shunting locomotives now being built. Other steps in the same direction, such as the use of a continuously variable transformer for inter-notch control, and of transducers with a continuously variable control current, are similar to the work in this country which was described in our issue of May 5 this year.

With conventional tap-changing and motors connected in parallel, slipping may occur, but it does not lead to racing of the axle and may be checked without notching back when the locomotive reaches a section of track where adhesion conditions are normal. If stability is not achieved, it has been found that moving the controller back one notch restores adhesion. With a d.c. locomotive, on the other hand, it is often necessary to notch back to zero to regain control. Investigation of the electrical characteristics of traction equipment is included in the French experiments to see if factors of adhesion still higher than those attained at present can be relied

on. French and British engineers are agreed on the need for improving the speed of response of anti-slip devices, and in this country work is in hand on the development of sensitive slip-measuring systems which would effect continuous control of torque so as to anticipate one of the factors which cause wheelspin rather than check it when it has begun.

## Electrification Conference proceedings

PUBLICATION of the proceedings of the British Railways Electrification Conference, 1960, was timed to allow inclusion of a statement on events since the papers were prepared. The volume now published runs to nearly 500 pages in a serviceable stiff binding, copiously illustrated with photographic reproductions and diagrams. Of the latter, it might well be said that the most significant is the outline comparison of British, Continental and American loading gauges. The use of high-voltage alternating current at industrial frequency in railway motive power imposed problems enough on its own, but it is only when the dimensions available to the British designer are compared visually with standards abroad that the intensification of the difficulties in this country is fully grasped by those not directly concerned with their solution. In spite of this, while the conference was sitting last autumn the final steps were being taken to bring nearly 600 miles of track electrified on the 50-cycle a.c. system into use, carrying some of the heaviest passenger traffic in the world. The facts are recalled in the statement by the British Transport Commission at the end of the published proceedings. Attention is drawn specifically to the conversion from d.c. to a.c. of the Eastern Region lines from Liverpool Street to Shenfield and Southend, the last stage of which was carried through without a hitch in one week-end. This acknowledgment will, we are sure, be particularly welcome to those responsible for the task, for at the time the operation took place, public attention was directed inevitably towards the other schemes which were bringing electric traction to areas previously without it.

The papers on locomotives, both collectively and in connection with individual designs, contain much of interest on mechanical parts, particularly bogies. Drawings and details are given of the two A.E.I. bogies—one incorporating rubber bearings and pivots on the Alstom principle, and the other with a modification of conventional swing link practice—of the English Electric bogie with its transverse anchor links in place of a spring plank; and of the North British G.E.C. designs in which the body weight is taken wholly on side bearer pads working in oil baths placed directly over the bolster springs. Fixed equipment is dealt with in the papers on power supply, overhead lines and civil engineering aspects, and eight papers on signalling and telecommunications are reproduced.

In addition much valuable information on all subjects of the conference and other factors outside its immediate terms of reference is contained in the reports of discussions. The documentation of electric traction since the second world war has been comprehensive. Apart from papers to institutions on individual projects and subjects, there have been the proceedings of the 1950 Convention on Electric Railway Traction held by the Institution of Electrical Engineers, and of the two conferences on 50-cycle technique held by the French National Railways at Annecy in 1951, and at Lille in 1955.

## 50-CYCLE LOCOMOTIVES for Katanga

FOUR series of 25 kV., 50-cycle locomotives have now been built for the Chemin de fer du Bas-Congo au Katanga by the Ateliers de Constructions Electriques de Charleroi (A.C.E.C.). The most recent consist of two locomotives with silicon rectifiers which are generally similar to the preceding "2300" class with ignitrons, but weigh 56 tonnes as compared with 75 tonnes. The power rating of 2,000 h.p. is virtually unchanged, the ignitron locomotives being rated at 2,040 h.p. The class "2400" silicon rectifier locomotive is a Bo-Bo. Leading particulars are as follow:—

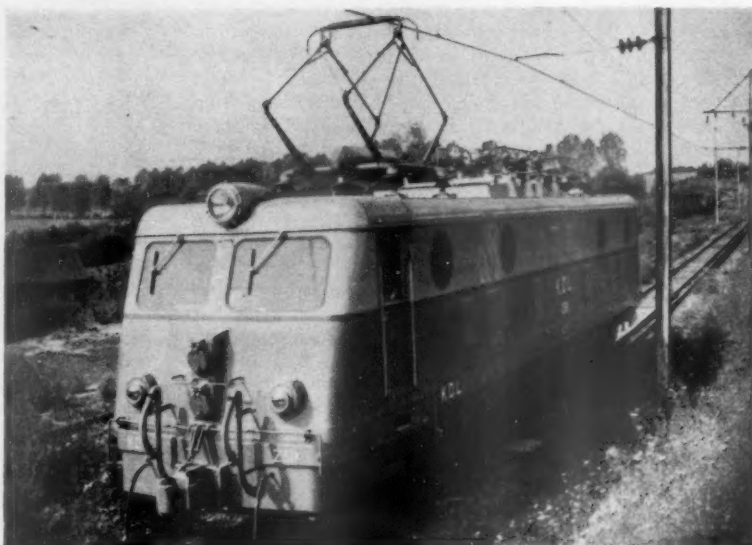
Length overall	...	...	39 ft. 4 in.
Width of body	...	...	9 ft. 10 in.
Gauge	...	...	3 ft. 6 in.
Wheel diameter	...	...	3 ft. 0 in.
Bogie centres	...	...	19 ft. 10 in.
Bogie wheelbase	...	...	9 ft. 2 in.
Continuous rating	...	2,000 h.p. at 28 m.p.h.	
Maximum speed	...	40 m.p.h.	
Total weight	...	56 tonnes	

Four d.c. traction motors are connected in two parallel pairs, each pair fed by a separate bridge-connected rectifier consisting of 72 silicon cells. Two arms of each bridge are formed by 16 cells in four parallel groups of four cells in series. The other two arms have five cells instead of four in each series group, because this half of the bridge acts as a discharge path for the inductive circuit formed by the motors and smoothing chokes. Provision for discharging the motor circuit is necessary because of the rapidity with which the current must be interrupted if the silicon cells are subjected to an over-



Corridor giving access to electrical equipment

**Improved power-weight ratio  
with silicon rectifiers**



*Silicon-rectifier locomotive for the 25 kV. 50-cycle system of the Bas-Congo-Katanga Railway*

load. This interruption is arranged to take place in less than half a cycle (1/100 sec.).

### Use of isolating switches

High-speed breaking of the rectifier circuit is obtained by means of isolating switches having a contact separation of no more than 1 mm. when open. The switches must therefore be opened off load. One switch is connected in each half of the rectifier bridge circuit, and since with the normal rectifier action the current flows first in one half of the bridge and then in the other, it can be arranged that the first isolating switch to open when an overload is detected is always that in the half of the bridge which is not conducting at the moment. When conduction by the other half ceases at the end of the half-cycle, the next half-cycle is blocked by the switch which has already opened. The second isolator opens in its turn, also in off-load conditions, and the sequence is completed by the opening of the normal motor contactors.

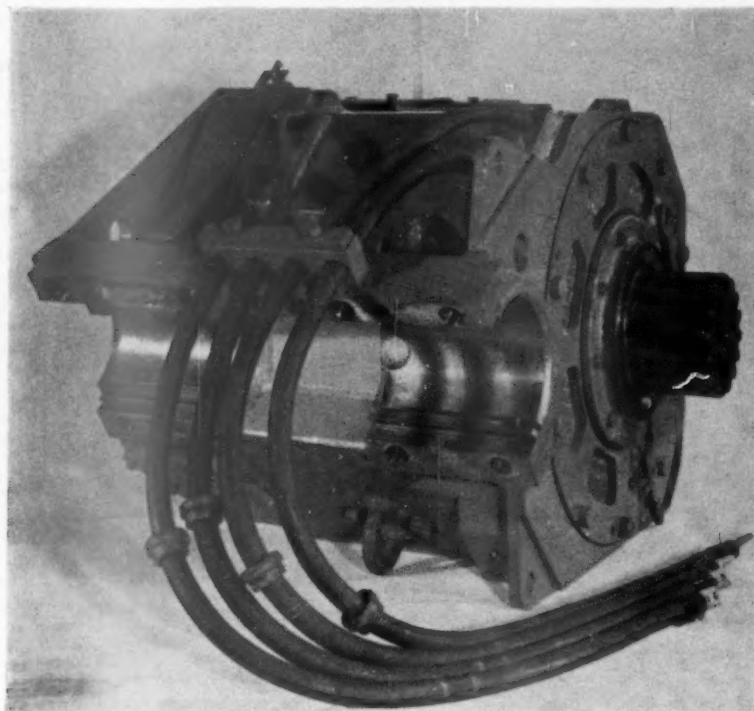
Fault detection is effected entirely by electronic circuits and devices in order to provide a high speed of response and eliminate the inertia of moving parts. An overload external to the rectifier is

arranged to cause reversal of the flux of a saturable reactor, this reversal inducing a voltage which triggers a normally-blocked transistor circuit. When the transistor conducts, it allows current to flow through the coil of a contactor. Closing of the contactor discharges a condenser, and this discharge current attracts an armature and releases one of the rectifier isolating switches, which during normal operation are latched closed against spring pressure. Selection of the transistor in the circuit controlling the isolator which is off load at the instant of the fault is also electronic.

### Detection of rectifier faults

Faults in the rectifier assembly itself are detected by means of transformers connected across points in the circuit which are normally at the same potential. Failure of a cell disturbs the balance, and the resultant current through a transformer primary induces a secondary voltage to trigger one of the transistors controlling the release of the isolating switches.

When the locomotive is developing its maximum tractive effort of 24 tonnes, each rectifier bridge passes a current of 1,600A. (800A. per motor). At the con-



*A.C.E.C. 2,000-h.p. 880-V. d.c. traction motor for silicon-rectifier locomotive*

tinuously rated output of 2,000 h.p. the motors take 460A. each, or 920A. per rectifier bridge. Control of the traction circuit is by means of a Jeumont-Heidmann high-tension tap-changer providing 20 notches, ten of which can be selected by the driver on his control handwheel. The traction motors are axle-hung mach-

ines operating at 880V., and cooled by an air flow of 100 cu. m. per min.

The two motors in each bogie are fed from individual rectifier cubicles measuring 5 ft. 5 in. high by 3 ft. 3½ in. wide by 1 ft. 11½ in. deep. Each cubicle consists of four stages, the top one housing the electronic apparatus and high-speed

isolators; the second containing the rectifier cells, with their fins projecting inwards into the ventilation duct; the third occupied by the resistance-capacitor network associated with the rectifiers; and the fourth containing the cooling fan. Little heating of the air takes place on its passage through the cubicle, and it is discharged into the locomotive body, whence it is aspirated by the blowers for the cooling chokes and traction motors. The body is laid out with two side corridors, one for communication between the cabs and the other, which is normally locked, for access to internal equipment.

#### **Rheostatic braking system**

A rheostatic braking system with magnetic amplifier control, similar to that of classes "2200" and "2300," is fitted in the locomotive. This system was described in our issue of December 19, 1958. The design of the "2400" class has been developed with special attention to the possibilities of hauling heavy loads with a lightweight locomotive, in view of the developments in 50-cycle traction in Katanga to which we referred in our issue of August 25 last. In the interests of adhesion, the fields of the motors driving the rear bogie axles are permanently shunted to a small extent to increase the current and tractive effort. Even without this device in action, one of the locomotives has started a train of over 1,000 tons on level track during trials. With the shunt operative, and slight sanding, the same train was started against a gradient of 1 in 80, when the tractive effort of 22.7 tonnes at the drawbar represented a factor of adhesion of 40.6 per cent.

## **NATAL-ORANGE FREE STATE railway link**

ON THE existing line to the Orange Free State the maximum load with three electric units was 800 tons and in the Natal direction an axle-load restriction of 10 tons per axle had to be applied. This latter restriction involved the haulage of empty trucks on every train to provide sufficient braking power. It was decided therefore to construct a line of main-line standard through Van Reenen's Pass, and work was started at the Brakwal end in 1957.

#### **Deviation and gradient**

Work now completed on the Brakwal-Van Reenen line of South African Railways involved the complete re-location of that sector. The ruling grade on the existing line is 1-in-30 uncompensated; that on the deviation is 1-in-50 compen-

**To remove axle-load restrictions, complete re-location of line was carried out between Brakwal and Van Reenen**

sated; and reduction in degrees of curvature is 1,457. The length of the existing line is 10 miles 6.5 ch., the length of deviation is 11 miles 34.1 ch., and the increase in length will be 1 mile 27.6 ch.

Because of the flatter grade it was necessary to increase the length of the line to raise the necessary height between Brakwal and Van Reenen. The old line climbs from Brakwal at 4,637 ft. above sea level to 5,585 ft. at 238 miles 17 ch., and then falls down into Van Reenen at 5,520 ft. The deviation is located in such a way that it climbs on a 1-in-50

compensated grade for the whole length from Brakwal to Van Reenen except for Clove crossing loop, which is on a grade of 1-in-400.

At one point, the line makes a complete spiral, mainly in tunnel, and crosses over itself where the lower portion is in the tunnel.

#### **Maximum load**

The maximum load on the old line in the Up direction was 800 tons with three electric units. On the new line, it has been raised to 1,350 tons with three





Crossing point on completed Van Reenen-Ladysmith main line

tons units (Type 1.E).

In the Down direction there is at present an axle-load restriction of 10 tons per axle which usually requires the haulage of empty trucks on every train to provide sufficient braking power on the 1-in-30 grade. On the deviation, with a 1-in-50 grade, there will no longer be

any axle-load restriction.

The new line has been laid with 96-lb. rails 119 ft. 10 in. long on wood sleepers. The present line is laid with 80-lb. rails.

Work began in June, 1957, at the Brakwal end. The earthworks were carried out partly by contract and partly departmentally by mechanical means,

with the use of modern earthmoving equipment.

All platelaying and overhead electrical work is being done departmentally.

#### Construction of tunnels

There are 10 tunnels on this deviation, totalling about three miles. Seven of these are of the conventional type, and three are of the "cut and cover" type.

Tunnels 1, 2, 5, and 6 were constructed on the "heading and bench" method, and Tunnels 3 and 4 were usually worked on "full face" excavation. The best performance for tunnel excavation on full face was obtained in Tunnel 3, when 952 ft. was excavated in 28 days.

The best achievement in tunnelling excavation for all tunnels was 1,300 ft. in one month.

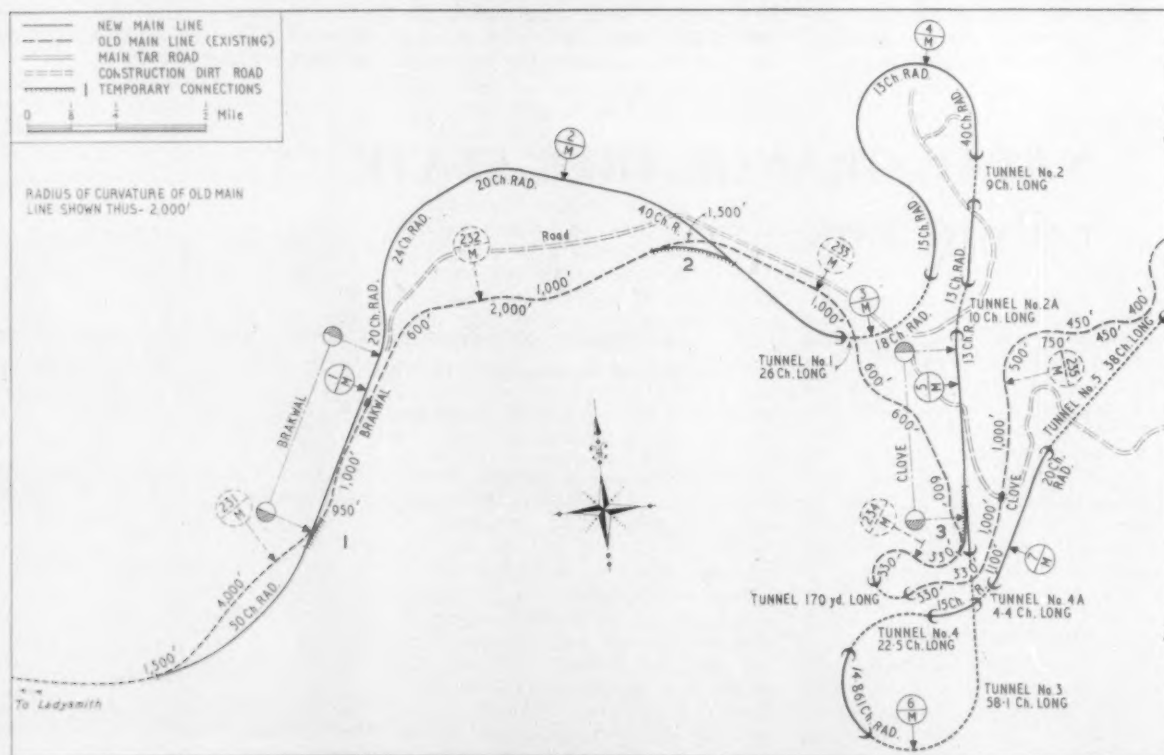
The work was carried out partly departmentally and partly by contract.

Total earthworks on this deviation amounted to approximately 1 million cu. yd. of excavation. This material was moved at a steady average rate of roughly 70,000 cu. yd. a month.

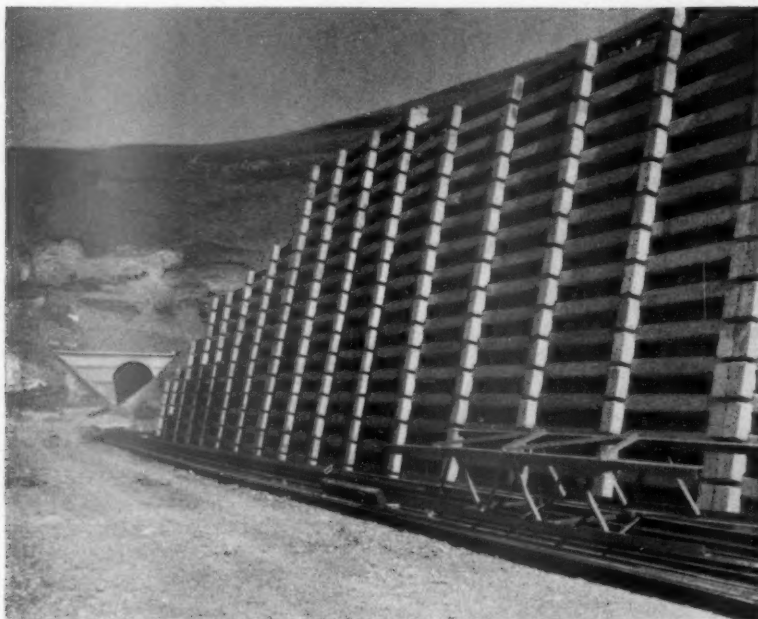
#### Curved viaduct

At one point it was necessary to construct a curved viaduct consisting of five 60-ft. arches spanning a valley with a maximum depth of 111 ft. below rail level.

Total estimated cost of the work is just over £2,800,000, and the expenditure to the end of September, 1960, was



Continuous diagrams showing old and new Brakwal-Van Reenen main lines



Precast-crib retaining walls between Tunnels 3 and 4

approximately £2,300,000.

It was expected that the project would be completed by March, 1961. There was very little delay and the line was opened to traffic on June 12, 1961. The continuous diagrams below show the alignment of the old and new routes and give details of the curves and gradients involved.

The line between Ladysmith in Natal and Harrismith in the Orange Free State was originally opened in 1890 and electrified in 1935. It has become more and more inadequate, in later years, for the traffic which has steadily increased in volume and capacity since the line was electrified.

## U.S.S.R. ELECTRIFICATION POLICY

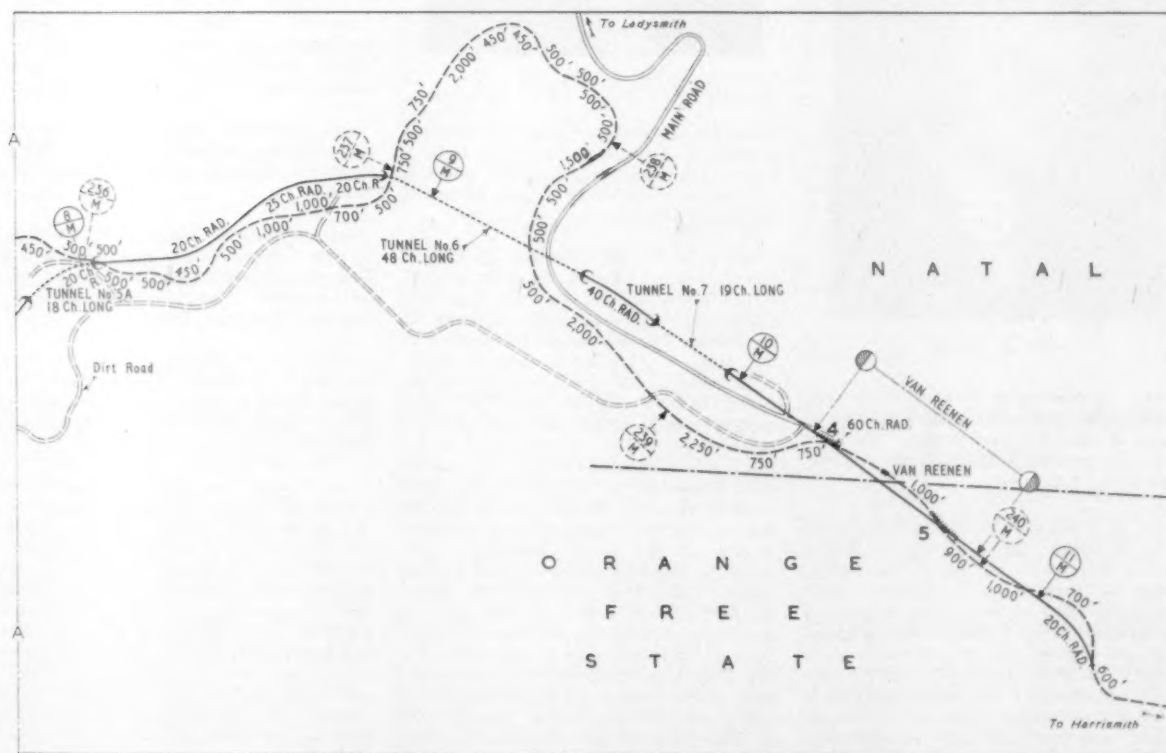
Mr. Boris Pavlovich Beshchev, Minister of Railways for the U.S.S.R. during his recent visit to the United States of America, said that electrification had been adopted as the basic policy of Russian Railways. He said that electrification of the entire railway system was the overall State plan. Sections with the greatest traffic density were to be electrified first and where freight density was not particularly heavy, diesel traction was to be used in the transitional stage.

Mr. Beshchev added that the use of long-welded rails was being extended. The lengths of welded rails used varied from about 650 ft. to nearly 4,000 ft. Long rails were used on main lines.

Rail transport in Russia directs 12 institutions of higher education with 73,200 students, plus 78 trade schools with 68,000 apprentices.

## ELECTRIFICATION IN ITALY

The Italian State Railways has been carrying out a planned programme of railway electrification at 3,000 volts direct current, the same system in use in South Africa. Italy has persisted in this programme in spite of the fact that in many countries, particularly France, the system of alternating-current traction and solid-state rectifiers has been adopted. Instead of adopting the popular a.c. form of traction, however, Italy is actually converting the last of its a.c. track to d.c.



Continuous diagrams showing old and new Brakwal-Van Reenen main lines

# PERSONAL

## British Transport Commission

MR. T. H. HOLLINGSWORTH, Traffic Adviser, British Transport Commission, has retired.

MR. S. G. RYDINGS, Claims & Packaging Assistant, Railway Clearing House, British Transport Commission, is retiring at the end of September.

## British Railways

MR. R. YOUNG, Assistant Regional Accountant, British Railways, Scottish Region, who has been appointed Chief Accountant, joined the former London & North Eastern Railway in the Commercial Department in Edinburgh in 1927, became an accountancy apprentice in 1937 and trained in Edinburgh, London, Newcastle, York and Doncaster. He served in the Royal Navy during the war, and in 1946 joined the Divisional Accountant's Office in Newcastle. He has been



Mr. R. Young

Works Accountant at Cowairs (Glasgow), and Assistant to Regional Accountant (Mechanical & Electrical Engineering). He is an associate member of the Institute of Costs and Works Accountants.

MR. H. J. BOURN, Continental Superintendent, Southern Region, British Railways, who is to retire at the end of this month, began his career in the Continental Traffic Manager's Office of the London Brighton & South Coast Railway in 1912. On his return from active service in 1917, he was attached to the General Manager's Office and returned to the Continental Traffic Manager's Office in 1919, in the Passenger Department. He was closely associated with the re-establishment of the International Passenger & Baggage Tariffs. In 1937, he became Deputy Chief of

Passenger Section in the Continental Superintendent's Office and Chief of the Section in 1939. Mr. Bourn became Passenger Assistant to the Continental Superintendent in 1946 and was appointed Assistant Continental Superintendent in 1948. He is a member of the U.I.C. 1st Committee (Passenger) and was a British Railways delegate at the Revision of the Berne Convention (C.I.V.) and is a member of the Air-Rail Sub-Committee. He was Chairman of the Arrangements Committee for the European



Mr. H. J. Bourn

Timetable Conference held at Brighton in 1949 and of the U.I.C. Committee Meeting held at Eastbourne in 1951. Mr. Bourn is a Chevalier of the Order of Leopold and of the French Order of Merit of Tourism.

MR. L. A. DENNIS, Assistant Continental Superintendent, Victoria, Southern Region, British Railways, who has been appointed Commercial Superintendent, Shipping & Continental Department, a redesignation of the post of Continental Superintendent, began his railway career with the former Great Western Railway in 1928. After experience in Brentford and South Lambeth goods depots and in various sections of the Chief Goods Manager's office, he was, in 1935, transferred to the Staff Section of the General Manager's Office. A year later he was selected for a three-year course of special training in the Traffic Department after which he was employed as a relief Stationmaster, and on various operating duties. He joined the R.A.M.C. in 1940 and was attached to the Guards Armoured Division from its formation until his demobilisation. Mr. Dennis was appointed to the secretarial staff of the Continental Traffic Committee shortly before nationalisation. In July, 1950, he took charge of the continental merchandise accounts section of the Southern Regional Accountant's Office, and was



Mr. L. A. Dennis

promoted to be Chief of the Goods & Parcels Division (Local) three years later. In May, 1955, he was appointed General Agent for Switzerland, and in 1956 became Assistant Continental Superintendent. Mr. Dennis is an Associate Member and former Member of Council of the Institute of Transport.

MR. R. A. LONG, Commercial Superintendent (Great Eastern), British Railways, Eastern Region, has been appointed an Assistant General Manager, Scottish Region.

MR. H. SHEARD, Assistant to Commercial Superintendent (Claims), Euston, British Railways, London Midland Region, has retired.

MR. J. COWARD, Traffic Costing Officer, London, Tilbury & Southend Line, British Railways, Eastern Region, has been appointed Assistant Principal, British Railways School of Transport, Derby.

MR. M. J. RUTH, Machine Accounting Assistant, Works Accountant's Department, Doncaster, British Railways, Eastern Region, has been appointed Stores Accountant, Doncaster.

MR. F. BATEMAN, Traffic Assistant to the Divisional Traffic Manager, Manchester, British Railways, London Midland Region, who, as recorded in our issue of September 15, has been appointed District Operating Superintendent, Manchester (South), began his railway career at Newcastle-under-Lyme in 1924. He gained experience at a number of goods stations. He was transferred to the District Goods Manager's Office, Stoke on Trent, and in 1934 to Euston Headquarters. During the war he was concerned with new works schemes carried out by the railways for the Ministry of War Transport. In 1945 he became Freight Trains Inspector,





Mr. F. Bateman

Divisional Operating Superintendent's Office, Derby. In 1946 Mr. Bateman was made Head Office Inspector in charge of the Freight Shunting Analysis Committee at Derby, and later that year Assistant to the District Operating Superintendent, Leicester (located at Peterborough) and acted as District Controller Peterborough. In 1952, he became Assistant District Operating Superintendent, Barrow, and, in 1954, moved to a similar position at Derby. He was appointed Divisional Controller (Freight Services), Manchester, in 1956, and Traffic Assistant to the Divisional Traffic Manager, Manchester, in 1958.

MR. L. HAIGH, Stationmaster, Bubwith, British Railways, North Eastern Region, has been appointed Stationmaster, Driffild.

MR. J. H. SCOTT, Temporary Relief Stationmaster, Newcastle District, British Railways, North Eastern Region, has been appointed Stationmaster, Fourstones.

MR. G. F. WEATHERLY, Stationmaster, Middlesbrough, British Railways, North Eastern Region, has been appointed Stationmaster, Manchester Central.

## Overseas

MR. S. S. KOCHAK, Chief Electrical Engineer, North Eastern Railway of India, has been appointed Chief Electrical Engineer, Eastern Railway.

MR. RAJ NATH MUBAYI, Deputy Controller of Stores, Gorakhpur, North Eastern Railway of India, who has been appointed Controller of Stores, Eastern Railway, was born on November 25, 1910, at Lahore. After qualifying as a mechanical engineer, he joined the Tata Iron & Steel Co. Ltd., Jamshedpur, as a Senior Apprentice. He was one of the few to be selected in the first batch of the company's Indianisation Scheme to replace the covenanted personnel in the company's superior service. After training for a year and a half, Mr. Mubayi joined the former Bengal Nagpur Railway on July 3,

1933, as a Sleeper Passing Officer in the Eastern Group, Sleeper Control. In 1949 he was transferred to the Railway Stores Department as Assistant Controller of Stores and was posted at Madras on the former Madras & Southern Marahatta Railway. He was later appointed District Controller of Stores at Madras and thereafter at Golden Rock. After regrouping of the Indian Railways in 1952, Mr. Mubayi was posted to Delhi as District Controller of Stores on the Northern Railway. As a Purchase Officer at Head



Mr. Raj Nath Mubayi

Office, he was required to arrange and supply a large number of items of stores for the Railway Centenary Exhibition. In March, 1956, he was placed in the Junior Administrative Rank and was appointed Deputy Controller of Stores on the North Eastern Railway.

## Industrial

MR. R. F. HOWES has been appointed Method Study Officer, B.T.R. Industries Limited.

MR. I. MACKENZIE has been appointed Press Officer, Thos. Cook & Son Ltd., in succession to MR. G. PILE who has gone to Rhodesia.

MR. R. KRIS has been appointed Manager, Thermoplastics Mouldings & Extrusions, B.T.R. Industries Limited.

MR. P. BONNER has been appointed to the board of T. C. Jones & Co. Ltd., an associate company of the George Cohen 600 Group Limited.

MR. E. V. SMALL, Joint Managing Director, Associated Electrical Industries (Export) Limited, has been elected Chairman of Boving & Company.

DR. D. H. SHARP, Assistant to one of the Managing Directors, Fison's Limited, has been appointed Director (Technical), Federation of British Industries, from November 1. He will take up the appointment on the retirement of the present Technical Director, MAJOR-GENERAL A. H. DOVE, who is leaving

the Federation at his own request to devote more time to voluntary work.

MR. R. I. DOUGLAS has been appointed Export Sales Manager, Permali Limited. He will continue to be responsible for the sale of track insulation to British Railways.

MR. P. W. HOWARD, Deputy Chairman and former Managing Director of B.T.R. Industries Limited, has retired.

MR. J. P. CLIFTON, Manager, Technical Manuals Department, Witton Works, the General Electric Co. Ltd., has retired but will continue to serve in a consultative capacity until the end of September.

MR. H. WILSON has been appointed Home Sales Manager of J. C. Bamford (Excavators) Limited, and MR. J. G. LORINSON has been appointed Manager of Rochester Services Limited, the Service Company for J. C. Bamford (Excavators) Limited.

MR. A. E. FLACK, Divisional Superintendent, West Division, Central Road Services, London Transport Executive, who has been acting as Superintendent (Running), Central Road Services, has retired.

MR. J. E. HUTTON, formerly Sales Director, Asbestos Cement Limited, one of the subsidiary companies in India of Turner & Newall Limited, will join the board of Turners Asbestos Cement Co. Ltd. on October 16.

The board of Turners Asbestos Cement (Nigeria) Limited has not yet been fully constituted but will include MR. R. M. BATEMAN, Deputy Chairman, Turner & Newall Limited, the parent company; MR. K. NEVE, a member of the board of the parent company, and SIR JOHN RANKINE, until recently Governor of the Western Region of Nigeria.

SIR NORMAN KIPPING, Director-General, and MR. J. WHITEHORN, Deputy Director (Overseas), of the Federation of British Industries are visiting Japan from October 4 to 21. During their stay Sir Norman and John Whitehorn will have discussions arranged by the Keidanren—the equivalent in Japan of the F.B.I.—and will visit a number of Japanese factories. They will also be visiting the British industrial and commercial communities in Tokyo and Osaka.

## Transport Users' Consultative Committee

COUNCILLOR G. R. BEESTON has been appointed to be an additional member of the Transport Users' Consultative Committee for Wales & Monmouthshire until July 31, 1962.

## Railway Students' Association

MR. A. R. DUNBAR, Manpower Adviser, British Transport Commission, has accepted the office of President of the Railway Students' Association for the 1961-62 session. He will deliver his Presidential address at the opening meeting at the London School of Economics on October 18.

# NEW EQUIPMENT *and Processes*



## HEIGHT AND STAGGER GAUGE

A height and stagger gauge offers a specialised rangefinder for measuring the position of overhead cables in relation to railway lines. It has the great advantage over conventional methods that the power need not be switched off while measurements are being made. This makes it particularly useful for maintenance and routine checking as well as for constructional work.

The instrument is in service in several regions of British Railways, which also was responsible for evaluating the prototype. The design is such that instruments can be made for any wire height or track width likely to be found in practice. Accuracy of measurement is to within about  $\frac{1}{4}$  to  $\frac{1}{2}$  in. under normal conditions.

The gauge is mounted on the calibrated horizontal bar of a light alloy stand which rests on the rails. The operator looks into an eyepiece and sees two images of the overhead cable in the upper and lower halves of the field of view. Height is measured by turning a calibrated knob until the two images are in coincidence. Stagger, or horizontal position, is measured by sliding the instrument along the bar to align the images with a reference mark in the field of view.

Although designed for use with railways, the gauge with a suitable stand can be used for the measurement of the height of any cable or structure with a straight horizontal edge. The normal range of 13 to 20 ft. could be modified slightly to suit other requirements.

Further details can be obtained from the manufacturer, Barr & Stroud Limited, Kinnaid House, 1, Pall Mall East, London, S.W.1.

## TRANSMISSION UNITS

A wide range of Hydro-Stabil hydrostatic transmission equipment is to be manufactured under licence in Great Britain. Until now, the replacement of mechanical transmissions by hydrostatic units has been limited to special applications because of their high cost. The availability of a stock range of units, produced in economical production quantities, makes possible a much wider use of the equipment.

The 2-130 h.p. range includes ten displacement and ten variable-displacement pumps and motors, evenly stepped in capacity. A wide range of torque conversions can therefore be met by the use of standard equipments.

Axial pistons are used in the pumps and motors. In the variable-displacement units, the cylinder barrel is able to move in an angular plane up to 25 deg. on each side of the drive-shaft centreline. The effective stroke of the piston and hence the oil displacement of the unit is controlled by this angular position. With zero setting there is no relative movement of the piston within the cylinder when the assembly is rotated, and therefore no delivery or admission of the fluid takes place.

The setting of the angular position is accomplished by servo-action in the

large units and direct manual connection in the small units.

In a transmission system comprising a variable-displacement pump and fixed displacement motor, the pump can be fitted with a control unit to give a constant maximum horsepower output. This is a pressure-sensitive servo-positioner and will ensure the most efficient use of the prime mover without overloading the hydraulic equipment.

The variable-volume pumps are designed for immersion in the hydraulic fluid reservoir, integral with which are two detachable gear pumps, one to operate the servo control and the other to provide a boost to the inlet and maintain the required circulation for cooling and lubrication under all conditions. This results in a compact installation with minimum external pipework.

To meet the special requirements of a small vehicle capable of carrying 2 tons at speeds up to 20 m.p.h., a complete transmission system was incorporated in an axle unit. This comprises a variable-volume pump under direct pedal-control and two motors. Each wheel is separately driven by its own motor through a spur reduction gear of 6.7:1. The axle casing constitutes the hydraulic fluid reservoir of 4 gal. An external cooler is required, and this was provided by an annular tube surrounding the propeller shaft. This assembly replaces a conventional clutch, gearbox, final reduction gear, and differential. As the torque conversion is positive and smoothly progressive through zero speed to reverse, only parking brakes are required.

Further details of this equipment, which is illustrated on page 349, can be obtained from the U.K. licensees, the Plessey Co. Ltd., Industrial Hydraulics Division, Cheney Manor, Swindon, Wiltshire.

## ALL-PURPOSE MASTIC

An all-purpose mastic, suitable for all general sealing work, is available in collapsible tube form in mid-cream, mahogany, grey, black, white, brick-red, and teak. It forms a tough flexible skin round any part of the compound exposed to air. Should movement be beyond the normal stretch properties of the surface skin, the mastic will break and re-seal without breaking away from the edges or body of the joint. A surface forms within 18-24 hr., when the mastic may be painted without discolouration.

Further details can be obtained from the manufacturer, Evomastics, Limited, Stafford.

## "Hydro-Stabil" hydrostatic Transmission

On September 15, the Plessey Co. Ltd. held a demonstration of the "Hydro-Stabil" hydrostatic transmission equipment, for which a licence agreement to manufacture and sell in the United Kingdom and British Commonwealth has been made with Guldner-Motoren-Werke of Germany. For the manufacture of this equipment the Plessey Co. Ltd. has acquired a factory of 50,000-sq. ft. floor area at Cheney Manor, Swindon, adjacent to the company's Industrial Hydraulics Division.

During the initial period required for equipping the new factory, pilot installations by Plessey will be fitted with either complete assemblies imported from Guldner, or Plessey assemblies of imported components.

The complete transmission is a combination of positive displacement pumps and motors of fixed or variable capacity, arranged with suitable control gear to give stepless torque conversion over a wide speed range.

The equipment available covers the nominal input ratings of 2 h.p. to 130 h.p. in ten steps. This range has been fully developed by Guldner and successfully applied to many types of industrial vehicles for mechanical handling, shunting locomotives, delivery trucks, and road rollers.

On vehicle applications, two pedals only are required for the complete control of travel, speed, and braking, in either direction. For the demonstration a 22-h.p. diesel-engine Hydrocar was used, having a payload of two tons and a maximum speed of 20 m.p.h. On this vehicle the complete transmission, comprising one variable-displacement pump and two fixed-displacement motors, is housed in the rear axle. Without using the parking brake, this vehicle could be started from rest or held stationary on a 1-in-4 gradient. When used as a tractor, a trailer load of 10 tons can be hauled.

Other important applications of the Hydro-Stabil transmission include crane winches and machine tool drives, for which it is claimed that the equipment is lighter, and reversal obtained more quickly, than with the equivalent electrical transmission.

A review of the design features of this transmission is given in our New Equipment Section this week.



Demonstration diesel-engine Hydrocar

## LAST DAY OF STEAM



Special train to mark last day of steam-hauled passenger trains on London Transport

## Staff & Labour Matters

### London busmen's threat to overtime working

At a recent delegate meeting of London bus workers, a resolution was passed seeking the authority of the Executive Council of the T. & G.W. Union to ban overtime and rest day working in protest against further cuts in bus service schedules in respect of the winter timetables. The men contend that they are having to work excessive overtime due to the shortage of staff. They feel the position would be alleviated if the rates of pay and conditions of service were to be improved so as to attract additional recruits. The resolution will be considered by the T. & G.W. Executive Council this week.

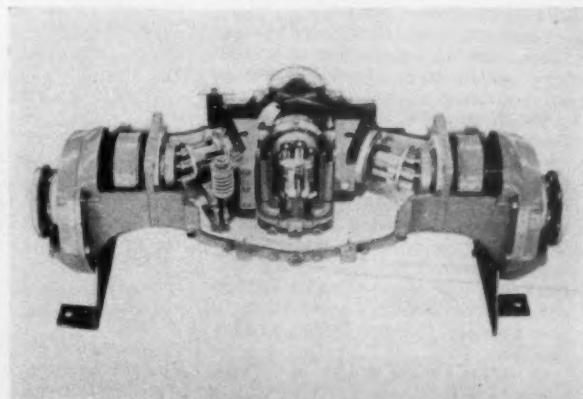
### Threat of rail strike

The West Midland District Council of the N.U.R. have passed a resolution calling

for strike action on October 29 unless their justifiable wage claim for a substantial increase is met by October 28. The Union's claim was heard at a meeting of the Railway Staff Joint Council on August 21, and the Commission's reply is awaited.

### THE PENTLAND & TINTO EXPRESS

This train, a special, being run by the Branch Line Society, will leave Leith (North) at 1.50 p.m. on Saturday, September 30. After a stop at Murrayfield at 2 p.m. the special will proceed via the Balerno loop to Carstairs thence to Broughton the present terminus of the Symington-Peebles branch. On the return journey the Wilsontown branch will be visited and the train is due in Edinburgh (Waverley) via the new Slateford-Craiglockhart connection at 7.50 p.m. The train will consist of the two restored Caledonian Railway coaches hauled by an 0-4-4 tank locomotive of the same company.



View of the Hydro-Stabil transmission



## CONTRACTS AND TENDERS

### £55,000 construction contract at Doncaster Locomotive Works

The North Eastern Region of British Railways has placed a contract for superstructure to the proposed diesel store at Doncaster Locomotive Works with T.G. Construction Co. Ltd., a member of the Tarmac group. The contract is worth £55,000.

Matisa Equipment Limited has received the following orders:—

4 B-60 automatic ballast tampers, 2 standard gauge and 2 narrow gauge fitted with automatic levelling equipment for Japanese National Railways

2 B-60 heavy duty ballast tampers for Kinki Nippon Railway Co. Ltd.

1 PV5 track recording trolley for the Burma State Railways

1 B-60 heavy duty automatic ballast tamper fitted with automatic levelling equipment for the French contractors Dequenue & Gival, another contractor; Drouard & Co. has ordered a B-60 ballast tamper

2 speed tampers for the Chesapeake & Ohio Railway Company

2 speed tampers and 1 PV5 track recording trolley for the Mauretanian contractors, Miferma.

A. G. Wild & Co. Ltd., of Sheffield, have received valuable repeat orders from Pakistan for patent lavatory flushing valves for use in rolling stock. Quantities of similar flushing valves have recently been delivered to Peru, Japan and Eire and the units are already used extensively in Burma, Malaya, the Netherlands and by British Railways (Southern Region).

British Transport Commission (South Wales Docks) has placed the following contract:—

Thos. W. Ward Limited: provision of 18½ in. centres, breakbed S.S. & Sc. lathe, Central Workshops, Cardiff Docks.

British Railways, Eastern Region, has placed the following contracts:—

Connaught Contractors (Send) Limited: supply, delivery and erection of an electrical installation at March (Whitemoor) Up yard sidings;

The Butterley Co. Ltd.: supply and delivery of steelwork for reconstruction of portion of superstructure of underline bridge No. 666 carrying Up and Down main lines over Metropolitan Water Board's aqueduct, between Lea Bridge and Tottenham;

A. Bradbury & Son (Contractors) Ltd: construction of a new signalbox at Seymour Junction, Staveley; construction of a new signalbox at Horns Bridge, Chesterfield;

Crompton Parkinson Limited: supply, delivery and erection of E.H.V. switchgear for Sheffield (Tinsley) Marshalling Yard;

Fuller Electric Limited: installation of 25 kV. switchgear in track sectioning cabins at Witham and Hill House; minor modifications at Colchester feeder station, involving the linking up of switchgear with remaining equipment;

Wellerman Bros. Ltd.: demolition of existing bridge over Shepcote Lane and construction of new bridge in its place, also construction of single span bridge over an accommodation road and execution of earthworks at Tinsley, Sheffield;

R. F. Herron Limited: construction of control cabin, demolition and recovery of certain redundant assets and alterations to structures at Ipswich Motive Power Depot;

Paterson Hughes Engineering Co. Ltd.: dismantling and removal of three existing transporter cranes, supply and erection of two 30-cwt. electric transporter cranes at Bishopsgate Goods Depot;

T. G. Construction Co. Ltd.: provision of superstructure to diesel stores building at Doncaster Locomotive Works.

**Advance information.** The Railway Administration of Syria is shortly to issue a call for tenders for the construction and equipment of a factory to produce railway sleepers for the Lattakia-Qamisieh Railway. 1½-million sleepers will be required over a period of three years. It has not been decided whether they will be ordinary or pre-stressed. The specification of the sleepers is as follows:—

Weight, 52 kg. per m.

Width, interior measurement of track 1.435 m.

Curves, minimum radius 400 m.

Slope, maximum 12/1,000.

United Kingdom firms interested in the project may wish to write to M. Joseph Kalas, Abu Rumaneh (Randa) Rue Hariri, Immeuble Malas, Damascus.

**The Export Services Branch, Board of Trade, has received calls for tenders as follows:—**

**From Australia:**

4 signal transformers 50kVA, 22/2 kV., 50-cycle outdoor type.

The issuing authority is the Secretary, Victorian Railways, Melbourne, C.1, to whom bids should be sent. The tender No. is 62056. The closing date is October 11, 1961. The Board of Trade reference is E.S.B./29437/61.

**From Pakistan:**

8,960 phowrahs 4 lb.

The issuing authority is the Chief Controller of Purchase, Pakistan Western Railway, Empress Road, Lahore, to whom bids should be sent. The tender No. is P3/392/D2/1961. The closing date is October 7, 1961. The Board of Trade reference is E.S.B./29161/61.

**From the Philippines:**

17 items of spare parts for diesel-electric locomotives.

The issuing authority is the General

Manager, Manila Railroad Company, Tutuban Terminal Building, Manila, to whom bids should be sent. The tender No. is 44. The closing date is September 27, 1961. The Board of Trade reference is E.S.B./29430/61.

**From South Africa:**

2 pneumatically operated floor-type core making machines and equipment.

The tender No. is F.8802. The closing date is October 13, 1961. The Board of Trade reference is E.S.B./29702/61

Supply and delivery of furnace fuel oil during the period from January 1, 1962 to December 31, 1962. The total quantity likely to be required for various areas is 4,397,300 gal.

The tender No. is E.8829. The closing date is September 29, 1961. The Board of Trade reference is E.S.B./29489/61.

1 shot blast machine

2 dust extraction units

1 shot blast chamber.

The tender No. is F.8795. The closing date is October 13, 1961. The Board of Trade reference is E.S.B./29492/61.

1 hydraulic diesel-driven swing-loader, bucket capacity approx. ¾ cu. yd. lifting capacity not less than 3,000 lb.

The tender No. is F.8850. The closing date is September 29, 1961. The Board of Trade reference is E.S.B./29490/61. The issuing authority for the above tenders is the Stores Department, South African Railways. Bids should be sent to the Chairman of the Tender Board, S.A.R., P.O. Box 7784, Johannesburg.

**From Sudan:**

1 overhead crane and gantry, 10 cwt. safe working load.

The tender No. is 2434. The closing date is October 16, 1961. The Board of Trade reference is E.S.B./29446/61.

1 heavy-duty drilling machine.

The tender No. is 2440. The closing date is October 26, 1961. The Board of Trade reference is E.S.B./29444/61.

1 overhead crane and gantry, 10 cwt. safe working load.

The tender No. is 2433. The closing date is October 12, 1961. The Board of Trade reference is E.S.B./29445/61.

1 heavy-duty drilling machine, drilling capacity in steel 1½ in. dia.

The tender No. is 2440. The closing date is October 26, 1961. The Board of Trade reference is E.S.B./29730/61.

1 beam and angle bending and straightening machine.

The tender No. is 2437. The closing date is October 19, 1961. The Board of Trade reference is E.S.B./29462/61.

1 agitating gear and chemical injection for softener.

The tender No. is 2318. The closing date is October 30, 1961. The Board of Trade reference is E.S.B./29729/61.

The issuing authority for the above tenders is the Controller of Stores, Sudan Railways, Atbara, to whom bids should be sent.

## NOTES AND NEWS

**Evershed motor division established.** Evershed & Vignoles Limited has established a fractional-horsepower motor division at Devonshire Works, Dukes Avenue, Chiswick, telephone number Chiswick 7801.

**Valve companies agreement.** Dowty Hydraulic Units Limited, Rubery Owen & Co. Ltd., and Hydraulic Units Specialities Company of Wisconsin, U.S.A., have concluded an agreement to manufacture and market a range of hydraulic control valves in this country.

**Commission appeals against air licence.** The British Transport Commission appealed against the "A" licence grant by the Air Licensing Board for an unlimited tourist class and cargo service by Morton Air Services between Swansea and Birmingham. The appeal was adjourned and the decision will be made known later.

**Television train in Wales.** The British Railways' television train, usually based in the Scottish Region, is to be used for an outing to North Wales by the staff of a group of banks in the Manchester area on September 24. The train will start from Hazel Grove and will go to Rhyl and Colwyn Bay.

**Presentation to Mr. H. L. Brazier.** The illustration below shows Mr. H. L. Brazier, former Acting Chief Secretary, British Transport Commission, who retired on May 31, being presented with a farewell gift



*H. E. Major-General Ahmed Magdout El Bahari at the Vulcan Foundry Ltd*

on behalf of the members of the Senior Officers' Mess, by the President, Mr. J. M. Murray (right), at a luncheon recently.

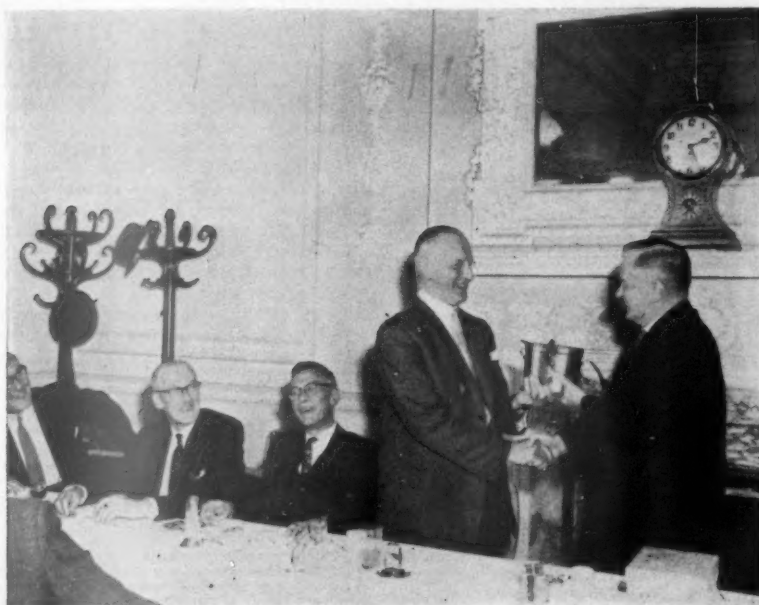
**Tube depot extended.** The Metallic Seamless Tube Co. Ltd. has extended its London depot at 86-88, Goswell Road, E.C.1.

**Sudanese Minister's visit.** The Sudanese Minister of Communications, Major-General Ahmed Magdout El Bahari, visited the Vulcan Foundry Limited Works at Newton-le-Willows, where he saw some of the ten 1,875-h.p. diesel-electric locomotives for the Sudan Government Railways under con-

struction. In the illustration the Minister can be seen examining a cast-steel frame for one of the locomotives. With the Minister, from left to right, are Mr. D. Gudgin, Works Manager, Vulcan Foundry Limited; Mr. Gorashi Mohamed Faris, Chief Inspector of Police, Sudan; Mr. H. J. Hulme, Chief Engineer, and Mr. G. Collingwood, Managing Director, Vulcan Foundry Limited.

**Institution of Locomotive Engineers awards.** The following awards for papers have been made by the Council of the Institution of Locomotive Engineers: the Frederick Harvey Trevithick Award to Mr. W. J. A. Sykes for his paper "Operating Experience of diesel-electric train sets on the Hastings service of the Southern Region," The Institution of Locomotive Engineers Award to Mr. T. A. Eames for his paper "Refrigerated transport on railways"; a Special Award to Mr. G. M. Barratt and Mr. S. Bairstow for their papers "Spectrographic analysis of crankcase lubricating oils as a guide to preventative maintenance of locomotive diesel engines," and "Control of quality of crankcase lubricating oils of locomotive diesel engines in service"; the Alfred Rosling Bennett Award to Mr. W. G. F. Thorley and Mr. G. O. B. Clarke for their paper "Work study and its application to motive power activities"; the William Alexander Agnew Award to Mr. J. H. Cansdale and Mr. G. Collins for their paper "Rheostatic braking applied to multiple-unit trains"; the Stewart-Dyer Awards to Mr. A. C. D. Malcolm for his paper "Final inspection and testing of locomotives for overseas railways" and to Mr. E. Sharp for his paper "Diesel-electric locomotive testing with the British Railways L.M.R. mobile test plant."

**West Riding express delayed.** The "West Riding," the train introduced by the North Eastern Region of British Railways between London and Leeds on September 11, was delayed by the illness of the guard and by a



*Mr. H. L. Brazier receiving his farewell gift from Mr. J. M. Murray*



Loading cases of graphite blocks into French ferry wagon

signal failure at Bawtry on its first day in service. It created a record by covering the 106 miles from Hitchin to Retford in an average of 78.8 m.p.h., and in spite of being delayed was only 3 minutes late into Leeds.

**Graphite consignment for Italy.** The North Eastern Region of British Railways is transporting 2,000 tons of graphite blocks for use in constructing an atomic-power plant at Latina, in Italy, from the works of A. Reynolle & Co. Ltd., at Newcastle. The illustration shows one of the blocks, weighing about 12 cwt., packed in a wooden case, being loaded, by a fork-lift truck, into a wagon, a number of which have been specially adapted for use on British and Continental lines and on cross-channel ferries, to avoid intermediate handling.

**General Railway Signal acquisition.** The General Railway Signal Company has purchased the Budelman Electronics Corporation of Stamford, Connecticut. That corporation will be operated as a wholly-owned subsidiary of the General Railway Signal Company under its present management. Formed in 1951, it specialises in point-to-point multi-channel radio and wire-line communication systems for use by industry, government agencies, and utilities. This acquisition is a further step in the General Railway Signal Company's programme of expansion in the electronics field, and is consistent with its plans for expanding its road and air control business. In 1961, the company acquired a controlling interest in Cardion Electronics Incorporated of New York, a company producing cardion designs and radar, electronic control, and communication products.

## Railway Stock Market

Not a lot of business has passed in foreign rails, but Antofagasta ordinary stock strengthened to 20½, compared with 21 a week ago, while the preference stock remained at 36 and the 4 per cent perpetual debentures

were again quoted at 40. Costa Rica ordinary stock was 38½ with 6½ per cent second debentures again quoted at 125. Chilean Northern 5 per cent first debentures were 49, Brazil Railway bonds 3½ and Guayaquil & Quito assented bonds changed hands at 57½.

Paraguay Central prior debentures were quoted at 18, Mexican Railway "A" bearer debentures at 58 and San Paulo Railway 3s. units were 2s. 1½d.

International Railways of Central America common shares were \$15½ with the preferred stock \$91.

Canadian Pacifics eased from \$44½ a week ago to \$44½. The preference stock was 54½, compared with 54½ a week ago, and the 4 per cent debentures eased from 54 to 53½. White Pass shares eased from \$11 to \$10½.

West of India Portuguese capital stock was 120½, and Barsi Light Railway ordinary stock was again quoted at 17. Nyasaland Railways ordinary shares were 11s. 4d. with the 3½ per cent debentures 32s. Midland Railway of Western Australia £1 units of second mortgage stock changed hands around 11s. 4½d.

Among shares of locomotive and engineering companies, G. D. Peters were 16s. 10½d., Beyer Peacock 5s. shares eased from 6s. 6d. to 6s. 3d., and Charles Roberts 5s. shares from 5s. 7½d. to 5s. 4½d. Westinghouse Brake receded from 33s. to 32s. 3d. Wagon Repairs 5s. shares were 22s. 6d. and Gloucester Wagon 10s. shares 10s. 1½d. Birmingham Wagon were 26s. 9d. and North British Locomotive 5s. 3d.

In electricals, A.E.I. at 37s. 3d. compared with 38s. 3d. a week ago, English Electric lost 9d. at 29s., and G.E.C. were also 29s., which compared with 30s. 3d. a week ago. Crompton Parkinson 5s. shares kept steady at 12s. 3d., Mather & Platt were 37s. 6d., and B.I.C.C. 58s. 9d.

Elsewhere, in machine tools, Alfred Herbert were 65s. 9d., but among other shares, Broom & Wade 5s. shares strengthened to 26s. after easing to 25s. 9d.

Vickers held steady at 32s. 9d., but Stone-Platt came down from 54s. 3d. to 53s. 3d.

and T. W. Ward at 71s. compared with 73s. a week ago, but Ruston & Hornsby remained around 23s. 3d. Babcock & Wilcox lost 9d. at 25s. 6d. Pollard Bearing 4s. shares were 36s. and Ransome & Marles 5s. shares 16s. 3d. Pressed Steel 5s. shares at 19s. 3d. compared with 20s. 6d. a week ago and Dowty Group 10s. shares came back from 34s. 10½d. to 34s.

## Forthcoming Meetings

Sept. 23 (Sat.). The Railway Correspondence and Travel Society. The four-counties rail tour.

Sept. 25 (Mon.). Institution of Railway Signal Engineers, Bristol. Signalling developments on the Railways of Southern Africa.

Sept. 26 (Tue.). The Institution of Locomotive Engineers. Ordinary general meeting and Presidential address. 5.30 p.m. 1, Birdcage Walk, S.W.1.

Sept. 27 (Wed.). Annual dinner of the East Indian Railway Officers. Connaught Rooms.

Sept. 27 (Wed.). Electric Railway Society. British Railways—The challenge of the future. Mr. E. C. Hilton, Divisional Traffic Manager, B.R. (W.R.). 7.15 p.m. Exchange and Engineering Centre, Birmingham.

Sept. 28 (Thu.). Permanent Way Institution, Nottingham & Derby section. Demonstration of track tools and equipment. Derby.

Sept. 30 (Sat.). Talylllyn Railway Preservation Society. Talylllyn Special, 1961. Paddington, 8 a.m.

Sept. 30 (Sat.). The Permanent Way Institution, visit to Fisons Pest Control Limited, Saffron Walden.

Sept. 30 (Sat.). Branch Line Society. Excursion, The Pentland and Tinto Express.

Oct. 3 (Tue.). Institution of Civil Engineers. Three prestressed concrete railway bridges. 5.30 p.m. Great George Street, S.W.1.

Oct. 3 (Tue.). South Wales & Monmouthshire Railways & Docks Lecture & Debating Society. Railways from the outside.

Oct. 4 (Wed.). Electric Railway Society. Reminiscences and Review of Traction. Dr. E. L. Andrews, Assistant Electric Traction Engineer, British Railways. 7 p.m. 153 Drummond Street, N.W.1.

Oct. 4 (Wed.). Institution of Mechanical Engineers. Some speculations on the future of railway mechanical engineering. 5.30 p.m. 1 Birdcage Walk, S.W.1.

Oct. 6 (Fri.). The Railway Club. Modernisation in East Kent.

Oct. 11 (Wed.). Institution of Railway Signal Engineers. The reliability of electronic apparatus. 6 p.m. Savoy Place, W.C.2.

## OFFICIAL NOTICES

THE Proprietors of Patent No. 794861 for "Improvements in or relating to Railway Car Brake Mechanism," desire to secure commercial exploitation by Licence or otherwise in the United Kingdom. Replies to Haseltine Lake & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

THE Proprietors of Patent No. 780696 for "Improvements in or relating to Brake Beam for Railway Car Trucks," desire to secure commercial exploitation by Licence or otherwise in the United Kingdom. Replies to Haseltine Lake & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.





Photo: courtesy of Associated Electrical Industries (Manchester) Limited

Welds in metal are stronger if oxygen is kept away from the molten metal. This is achieved by surrounding the actual arc and the immediate area with an inert gas or with hydrogen in lieu of air. DOCKERS' PAINTS have given sound protection to rolling stock, vehicles and buildings on the transport systems of the world in all weathers for more than 70 years.

**HAVE YOU A PROBLEM OF PROTECTION?**

Technicians at our Research Laboratories will advise you on any aspect of paint technology, including the choice and methods of application of DOCKERS' PAINTS.

**Protection**

**DOCKERS' PAINTS**

*Tested by Time in every Country under the Sun*

Docker Brothers · Ladywood · Birmingham 16 · England  
*Makers of Paints, Lacquers and Varnishes for Every Purpose*



**COMPLETE  
PROTECTION  
OF DIESEL RAILCAR  
TRANSMISSION**

by

**PUROLATOR**

REGD. TRADE MARK

**FILTERS**

AUTOMOTIVE PRODUCTS COMPANY LTD · LEAMINGTON SPA · WARWICKSHIRE

ONE OF THE  
AUTOMOTIVE  
PRODUCTS

GROUP



#### THE RAILWAY GAZETTE

A journal of Railway Management, Engineering, Operation, and Railway News. It covers every phase of railway activity. It is truly said of this journal that it is "Read wherever there are Railways." Weekly 2s. Annually £5 by post.

#### DIESEL RAILWAY TRACTION

A monthly review of world-wide developments in diesel-engine design, practice, and maintenance and diesel railway traction operation. Monthly 2s. 6d. Annually 35s. by post.

#### SHIPBUILDING AND SHIPPING RECORD

The only publication with direct appeal to both shipowner and shipbuilder. Its world-wide news organisation and technical articles and drawings put it in the forefront of shipping periodicals. Weekly 2s. Annually £5 by post.

#### COLLIERY ENGINEERING

A practical journal dealing with all aspects of coal production; every branch of coal mining technology is reviewed in detail and special attention is given to mechanisation and labour-saving machinery. Monthly 2s. 6d. Annually £2 by post.

#### COKE AND GAS

A technical journal dealing with the scientific and technical problems involved in the production of coke and gas in coke ovens and gasworks. Monthly 2s. 6d. Annually 35s. by post.

#### THE RAILWAY MAGAZINE

A popular magazine containing illustrated articles on Railways and Locomotives. Monthly 2s. 6d. Annually 35s. by post.

#### NEW COMMONWEALTH

Describes and illustrates significant developments in production, trade, transportation and related spheres in all countries of the Commonwealth. Monthly 2s. 6d. Annually £2 by post.

#### THE INDUSTRIAL CHEMIST

A technical journal devoted to the progress of applied chemistry and chemical engineering. It is of vital importance to the chemical manufacturer and all who employ chemical processes in their productive operations. Monthly 2s. 6d. Annually £2 by post.

#### WOOD

"Wood" is the only magazine of its kind. Primarily concerned with the use of wood, it includes articles on trees and timbers, design and construction in all decorative and practical wood usage, machines and machine practice, and trends in world supply. Monthly 2s. 6d. Annually 35s. by post.

#### FOOD PROCESSING AND PACKAGING

A journal devoted to the manufacture, packaging, and marketing of processed foodstuffs. Monthly 2s. 6d. Annually £2 by post.

#### WATER POWER

A technical journal devoted to the study of all aspects of Hydro-Electric Development. Monthly 2s. 6d. Annually £2 by post.

#### MINE AND QUARRY ENGINEERING

Articles of technical nature cover geology, modern methods of prospecting, the winning of ore and stone, the dressing of ore and minerals, and extraction metallurgy. Monthly 2s. 6d. Annually 35s. by post.

**TOTHILL PRESS LIMITED 33, Tothill Street, Westminster, London, S.W.1**



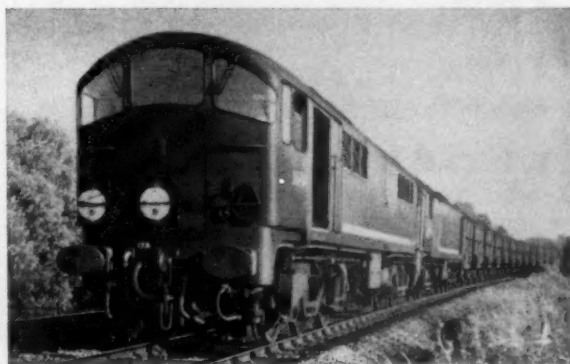
## ..but more chocolate is carried by British Railways

Thousands of tons of chocolate travel by train. Every night many hundreds of wagons leave chocolate factories up and down the country and are speeded on their way to the shops or for export by British Railways Express Freight Services. A lot of the chocolate goes to stores specially provided at or near the stations where it is held available in perfect condition for immediate distribution. There are more than 800 Express Freight trains time-tabled every weekday, many giving next morning arrivals over long distances. From many towns British Railways Export Express services give assured

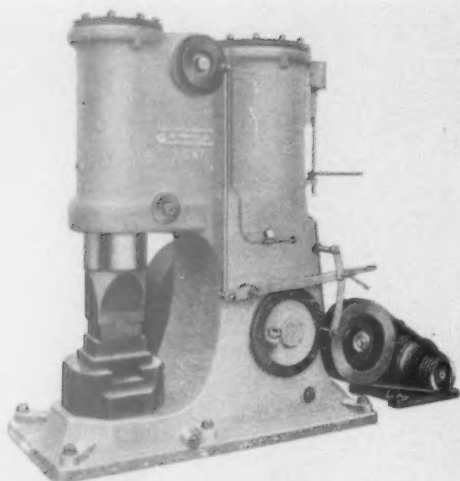
next-morning delivery for wagon load traffic to London Docks (Royal, India and Millwall Groups), Merseyside, Manchester, Goole, Grimsby, Hull, Southampton, Glasgow and Grangemouth. Charges are fully competitive: ask your Goods Agent for details.

**BRITISH RAILWAYS**

**MODERN FREIGHT SERVICES**







## PROVED BY PERFORMANCE

The essential features of a Power Hammer are—

- Reliability of Action
- Simplicity of Construction
- Ease of Control
- Economy in power consumption

That the P.B. Hammer meets these conditions is shown by the large numbers in use in all parts of the world and proves them suitable for the most arduous conditions.

Available in sizes  $\frac{1}{2}$  to 7 cwt. they are usually supplied as self-contained motor-driven units.

*Some of our other products include*

- ★ FANS. Light and Heavy Duty for all purposes.
- ★ BLOWERS. Positive displacement design of the Roots and Sliding Vane designs for all purposes.
- ★ SMITHY EQUIPMENT.
- ★ FOUNDRY EQUIPMENT.

**ALLDAYS & ONIONS**  
LIMITED

GREAT WESTERN WORKS • BIRMINGHAM 11 • Telephone: VICtoria 2251-4  
London Office: 2 Queen Anne's Gate • Westminster, S.W.1 • Telephone: WHIttehall 1923 4-5



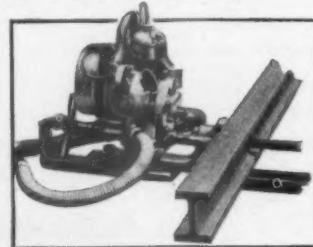
All  
about  
holes

No more aimless peppering or futile effort once you invest in a John Bull Magneto Petrol Drill. It will drill a hole through a 95 lb. high carbon rail in less than a minute, at the cost of a few shillings per day. Special jig plates and clamp ensure accurate, clean-cut holes. The same power unit takes attachments for boring, sawing, grinding and scratch-brushing.

## JOHN BULL

PETROL DRIVEN RAILWAY TRACK  
MAINTENANCE EQUIPMENT

*Simple to  
operate, light to  
carry, completely  
portable.*



For further information, please write to:

**HOWARD PNEUMATIC ENGINEERING CO LTD**

FORT ROAD, EASTBOURNE. 'PHONE: EASTBOURNE 4804/5  
TELEGRAMS & CABLES: HOWMATIC, EASTBOURNE

# Why will dive with Dreadnought?

Amongst the vast array of modern equipment in Dreadnought's hull will be an NBD Voltage Regulator controlling vital electrical equipment.

When Britain's first nuclear submarine makes her maiden voyage, NBD will be there.

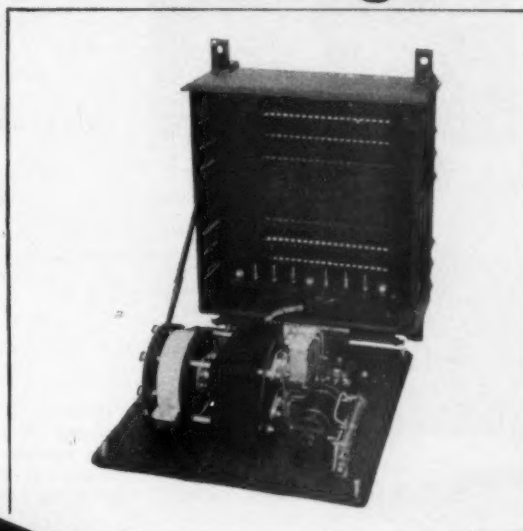
- Servo Motors
- Transistor Convertors
- Motor Generator Sets
- Automatic Voltage Regulators
- Rotary Transformers and Convertors
- High Frequency Alternators (400 to 3,000 c.p.s.)
- Permanent Magnet Alternators



**NEWTON  
DERBY**

NEWTON BROS. (DERBY) LIMITED, ALFRETON ROAD, DERBY.

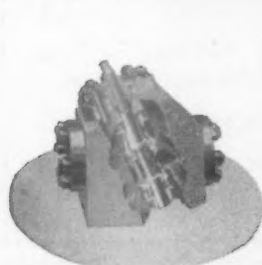
Telephone: Derby 47676 (4 lines). Grams: DYNAMO DERBY.  
London Office: IMPERIAL BUILDINGS, 56 KINGSWAY, W.C.2.



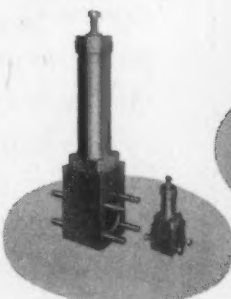
**LEH**  
DESIGNERS AND  
MANUFACTURERS OF  
HYDRAULIC  
EQUIPMENT

*Heavy  
Duty*

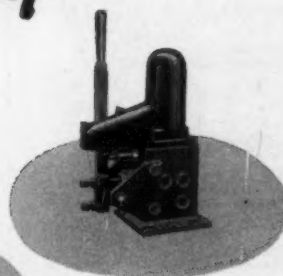
## HYDRAULIC VALVES



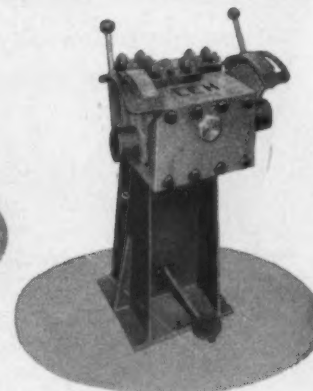
Balanced 'Inline'  
Stop Valve



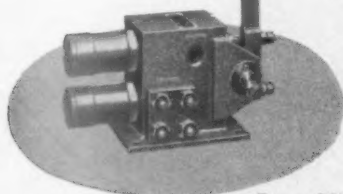
Spring Loaded  
Relief Valves



Drop Mitre Control  
Valve With Trip Gear



Piston Type  
Control Valve

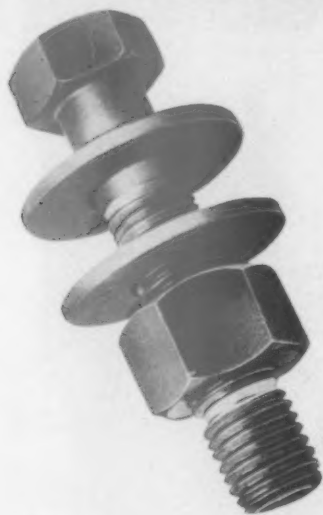


Drop Mitre  
Control Valve

Of exceptionally robust construction, L.E.H. Valves are eminently suitable for the control of direct hydraulic power applications in heavy industry and wherever complete reliability under arduous conditions is of paramount importance.

THE LEEDS ENGINEERING & HYDRAULIC CO. LTD. RODLEY, LEEDS.

Telephone: 'Pudsey' 2859.  
Telegrams: 'Pumps,' Rodley.



## Newall TORSHEAR bolts— an automatic choice ensuring scientific loading

Newall TORSHEAR bolting is proving an effective and economical method of fastening on

bridge steelwork for British Railways. The special benefits of the TORSHEAR method include:

One-man operation with the special air-tool; the onus of accurately loaded bolts is transferred from the wrench to the bolt—NO control is allowed to the operator; complete uniformity of loading—no over or under tightening; and inspection is limited to a visual check that all the bolt extensions have sheared.



### A. P. NEWALL & CO., LTD.

POSSILPARK • GLASGOW, N.2

Also at London and Birmingham

**RAILS. SLEEPERS AND  
EVERYTHING FOR SIDINGS.  
CONSTRUCTION AND  
MAINTENANCE.**

Write to **WHITES** Estd. 1869  
*of Widnes*

**R. WHITE & SONS (Engineers) LTD., P.O. BOX 2, WIDNES, LANCs.**  
Telegrams: "RAILS, WIDNES". Telephone: WIDNES 2425 (Three lines)

## BOUND VOLUMES

We can arrange for readers' copies to be bound in full cloth at a charge of 27s. 6d. per volume, post free. Send your copies to the Subscription Department, Tothill Press Limited, 33 Tothill Street, London, S.W.1.

## PROVIDENT MUTUAL LIFE ASSURANCE ASSOCIATION

(FOUNDED 1840)

**FUNDS . . . £25,000,000**

The PROVIDENT MUTUAL is a mutual and co-operative Association, the business being conducted solely for the benefit of the Policy Holders.

Life and Endowment Assurance to suit every requirement, including HOUSE PURCHASE. Premiums deducted through the paysheets.

Apply for particulars to:

**J. M. ROBERTSON, Managing Director, 25-31, Moorgate, London, E.C.2.**



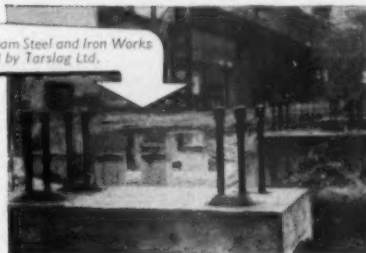
# DENSO

*fights*

Wherever the location, whatever the climate, DENSO has proved successful in fighting the battle against corrosion the world over.

Illustrated are three of the many important projects where the DENSO Anti-Corrosion Service has played its part in defeating the corrosion menace.

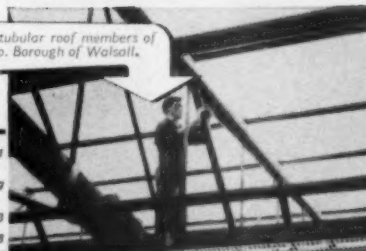
Anchor bolts at South Durham Steel and Iron Works Ltd. Site. DENSO protected by Tarslag Ltd.



The Tensioning Cables on the side towers of the new Forth Road Bridge are DENSO protected.



Applying DENSO Tape to tubular roof members of new swimming bath for Co. Borough of Walsall.



## CORROSION

The DENSO free advisory service is available to help you with your corrosion problems.  
Specialists in anti-corrosion treatment for over 30 years.



### WINN & COALES LTD

DENSO HOUSE CHAPEL ROAD  
LONDON S.E.27

Agents throughout the Commonwealth

London—Tel: GIPSY HILL 7511  
10 lines

Manchester—(Also Contracting  
Dept.) Tel: SALE 8271

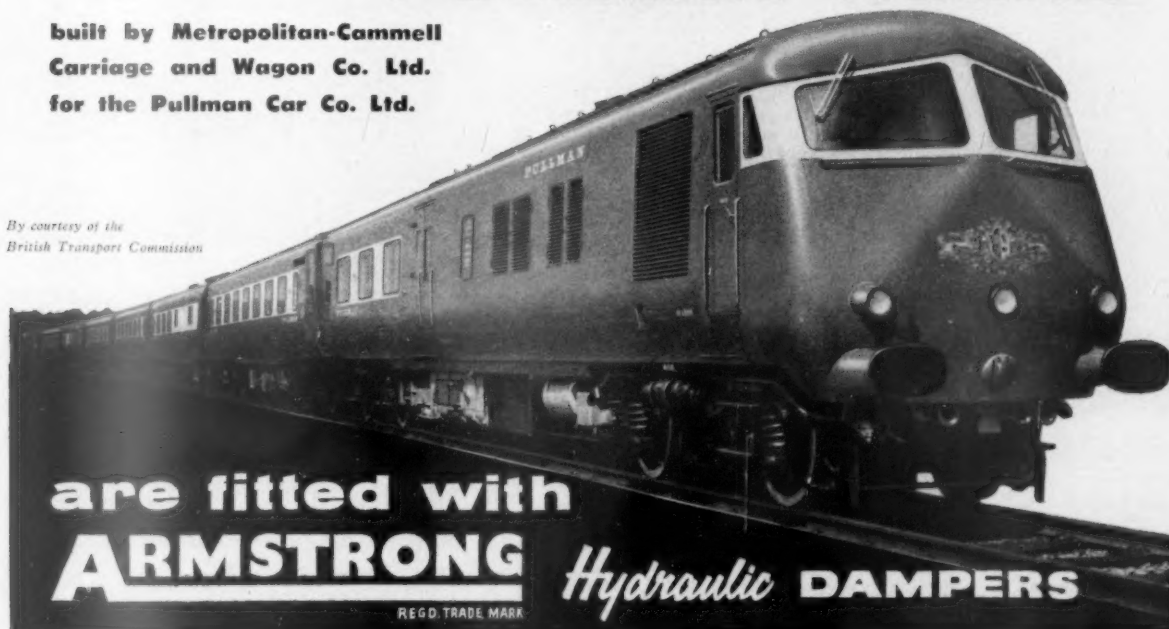
Belfast—Tel: 56623

Dublin—Tel: 61768

## The NEW Diesel Electric PULLMAN TRAINS

built by Metropolitan-Cammell  
Carriage and Wagon Co. Ltd.  
for the Pullman Car Co. Ltd.

By courtesy of the  
British Transport Commission



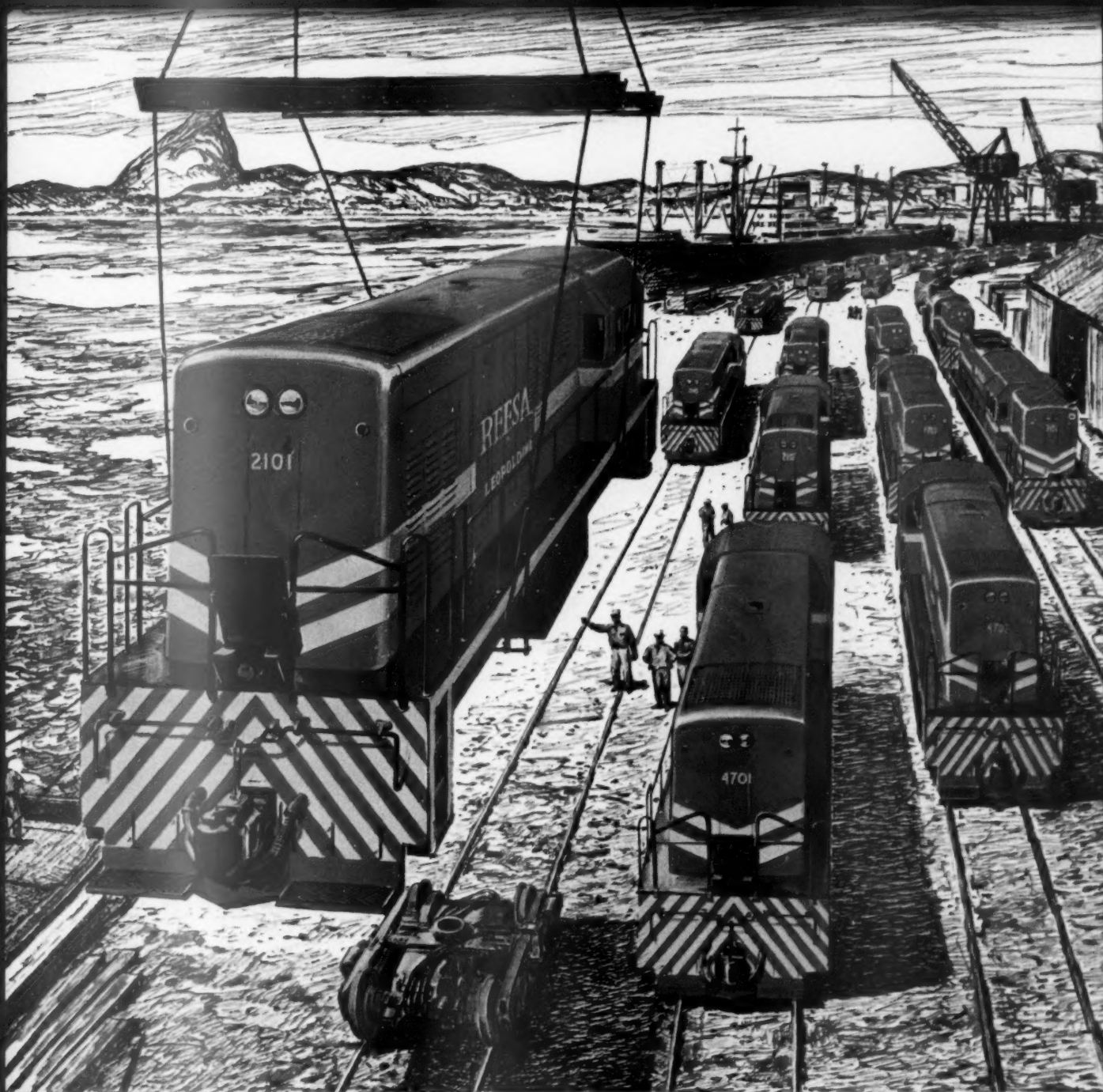
are fitted with  
**ARMSTRONG**

REGD. TRADE MARK

*Hydraulic* DAMPERS

ARMSTRONG PATENTS CO. LTD., EASTGATE, BEVERLEY, YORKSHIRE. Tel.: Beverley 82212

Aberdeen Cables Ltd.	Clyde Rubber Works Co., Ltd.	Hastler Telegraph Works, Ltd.	Monarch Controller Co., Ltd.	Smith, W., Gilmour & Co., Ltd.
Abingdon King Dick, Ltd.	Cobra (Wood Treatment), Ltd.	Henderson & Keay, Ltd.	Murex Welding Processes, Ltd.	Southern Forge Co., Ltd.
Airacraft Marine Products (Gt. Britain), Ltd.	Cockerill, S. A., Ougree	Henschel Werke, G.m.b.H.	Ltd.	South Wales Switchgear Co., Ltd.
Alfloe Water Treatments Service	Colvilles, Ltd.	Hiachi, Ltd.	Ltd.	S.P.E. Co., Ltd.
Alldays & Onions, Ltd.	Commonwealth Sales Corporation	Hoffmann Manufacturing Co., Ltd.	National Provincial Bank	Spencer Moulton, George, & Co., Ltd.
Allen, Edgar, & Co., Ltd.	Consolidated Pneumatic Tool Co., Ltd.	Holman Bros. & Co., Ltd.	Neil, R. H., & Co., Ltd.	Standard Telephones & Cables, Ltd.
Algemeine Elektricitats Gesellschaft	Conveyance Fork Trucks Ltd.	Howard Pneumatic Engineering Co., Ltd.	Newall, A. P., & Co., Ltd.	Steel Coy. of Wales, Ltd.
Andre Rubber Co., Ltd.	Cooper, Geo., & Sons	Hudswell Clarke & Co., Ltd.	Newton Bros. (Derby), Ltd.	Steel, Peech & Tozer
Armstrong Patents Co., Ltd.	Coventry Machine Tool Works, Ltd.	Hunslet Engine Co., Ltd.	Nife Batteries, Ltd.	Steels Engineering Products, Ltd.
Asquith, Wm., Ltd.	Cowans, Sheldon & Co., Ltd.	Hyde, Robert, & Son, Ltd.	Nippon Signal Co., Ltd.	Stirk, John, & Sons, Ltd.
Associated British Machine Tool Makers, Ltd.	Craven Bros. (Manchester), Ltd.	Hymatic Engineering Co., Ltd.	North Bar Tool Co., Ltd.	Stone, J., & Co. (Deptford), Ltd.
Associated Electrical Industries—G.R.S., Ltd.	Cravens Limited	Illingworth, E., & Co., Ltd.	North British Locomotive Co., Ltd.	Stream Line Filters, Ltd.
Associated Electrical Industries (Manchester) Ltd.	Crompton Parkinson, Ltd.	Imperial Aluminium Co., Ltd.	Nuts & Bolts (Darlaston), Ltd.	Suffolk Iron Foundry (1920) Ltd.
Associated Electrical Industries (Rugby), Ltd.	Davey, Paxman & Co., Ltd.	Imperial Chemical Industries, Ltd.	Oleo, Pneumatics, Ltd.	Sulzer Bros. (London), Ltd.
Associated Electrical Industries (Woolwich), Ltd.	Davey & Metcalfe, Ltd.	International Twist Drill Co., Ltd.	Ormerod Shapers, Ltd.	Summerson, Thos., & Sons, Ltd.
Associated Lead Manufacturers, Ltd.	Dean, Smith & Grace, Ltd.	Isca Foundry, Ltd.	Osborn, Samuel, & Co., Ltd.	Swiss Car Elevator Mfg. Corp., Ltd.
Atlas-Copco A/B	Dockers Brothers	Isothermos, Société Internationale des Applications	Oatmill Switchgear, Ltd.	Swiss Industrial Company
Auster, Ltd.	Dorman Long (Africa) Ltd.	Jackson Vibrators, Inc.	Owen & Dyson Ltd.	Swiss Locomotive & Machine Works
Austin Taylor Electrical, Ltd.	Dragonair, Ltd.	Kaye, Joseph, & Sons, Ltd.	P. & M. Co. (England), Ltd.	Sylgas Company, The
Automotive Products Co., Ltd.	Drewry Car Co., Ltd.	Kearns, H. W., & Co., Ltd.	Palnut Co., Ltd., The	Talbot Waggonfabrik
Bagnall, W. G., Ltd.	Drummond Asquith, Ltd.	Kearsley, Robert, & Co.	Parkinson Cowan Industrial Products, Ltd.	Tanges, Ltd.
Baker, John, & Bessemer, Ltd.	Du Pont (United Kingdom), Ltd.	Kendall & Gent, Ltd.	Parkinson, J., & Son (Shipley), Ltd.	Tarmac Roadstone Ltd.
Bayliss, Jones & Bayliss, Ltd.	Eagre Construction Co., Ltd.	Kenitra Co., Ltd.	Paterson Hughes Engineering Co., Ltd.	Taylor Bros. & Co., Ltd.
Beckett, Laycock & Watkins, Ltd.	Elastic Rail Spike Co., Ltd.	King, George W., Ltd.	Pearson Machine Tool Co., Ltd.	Taylor Bros. (Sandiacre), Ltd.
Belships Co., Ltd., Skibs A/S	Enfield - Standard Power Cables	Kisha Seizo Kaisha, Ltd.	Pel, Ltd.	Taylor F. & Sons (Manchester), Ltd.
BEN. Patents, Ltd.	English Electric Co., Ltd.	Kitchen & Wade, Ltd.	Pemali, Ltd.	Taylor Rustless Fittings Co., Ltd.
Beresford, James & Son Ltd.	English Steel Corporation, Ltd.	Kloekner-Humboldt-Deutz, A.G.	Peters, G. D., & Co. Ltd.	Tearne & Sons, Ltd.
Berry, Henry, & Co., Ltd.	E.N.V. Engineering Co. Ltd.	Krauss, Maffei A.G.	Phil'plug Ltd.	Tees Side Bridge & Engineering Works, Ltd.
Beyer, Peacock & Gorton Ltd.	Ericssons Signalkärbolag, L.M.	Kretz, Ing. Dipl.	Pirelli-General Cable Works, Ltd.	Telephone Manufacturing Co., Ltd.
Beyer, Peacock (Hymek), Ltd.	Eutectic Welding Alloys Co., Ltd.	Krupp, Friedr. Maschinen-fabriken	Planwell Engineering Co., Ltd.	Tempered Rubber Components Ltd.
Beyer, Peacock, Railway Equipment, Ltd.	Expanded Rubber Co., Ltd.	Kugelfischer Georg Schaefer & Co.	Plasser Railway Machinery (G.B.), Ltd.	Tempered Spring Co., Ltd.
Birfield Industries, Ltd.	Eyre Smelting Co., Ltd.	Kyosan Electric Mfg. Co., Ltd.	Plasser & Theurer	Thermite Welding (Gt. Britain) Ltd.
Birkett, T. M. Billington & Newton, Ltd.	Fairclough, Leonard, Ltd.	Lace Web Spring Co., Ltd.	Powell Duffryn Engineering Co., Ltd.	Thomas, Richard, & Baldwin, Ltd.
Birmingham Railway Carriage & Wagon Co., Ltd.	Falk, Stadelmann & Co., Ltd.	Lamp Manufacturing & Railway Supplies, Ltd.	Preformed Line Products (Gt. Britain), Ltd.	Thompson, John Motcr Pressing Ltd.
Bolton Gate Co., Ltd.	Fawcett Preston & Co. Ltd.	Lang, John, & Sons, Ltd.	Pressed Steel Co., Ltd.	Thomson, Thomas, Sons & Co. (Barhead), Ltd.
Bolton, Thos., & Sons, Ltd.	Ferguson Battery Co., Ltd.	Lamigraph Ltd.	Provident Mutual Life Assurance Association	Toledo Woodhead (Sheffield), Ltd.
Bonded Laminates, Ltd.	Ferrodo, Ltd.	Lansing Bagnall, Ltd.	Railway Signal Co., Ltd.	Town, Fredk., & Sons, Ltd.
Booth, James, Aluminium Ltd.	Fibreglass, Ltd.	Laycock Engineering, Ltd.	Ransomes & Rapier, Ltd.	Transport Brakes, Ltd.
Bowmaker (Plant), Ltd.	Finlay Engineering, Ltd.	Le Carbone (Great Britain), Ltd.	Rawlings Manufacturing Co., Ltd.	Transport Engineering Equipment, Ltd.
Boydell, E., & Co., Ltd.	Flexitol Engineering Co., Ltd.	Leeds Engineering & Hydraulic Co., Ltd.	Reagent Oil Co., Ltd.	Trico-Folherth, Ltd.
Bristol Siddeley Engines, Ltd.	Fowlie, John, & Co. (Leeds), Ltd.	Levick, John, Ltd.	Reynolds, A. & Co., Ltd.	Triplex Safely Glass Co., Ltd.
Britannia Batteries, Ltd.	French Railways	Lifting Gear Products (Engineering), Ltd.	Rheinhalt Sieger Eisenbahnbedarf, A.G.	Tulloch, Ltd.
British Electrical Repairs, Ltd.	Ganz-Mavag	Lockheed Precision Products Ltd.	Richards, Chas., & Sons, Ltd.	Turton, Geo., Platts & Co., Ltd.
British Ermeto Corp., Ltd.	General Electric Co., International	Lockspike, Ltd.	Roberts, Charles, & Co., Ltd.	Turton, Thos., & Sons, Ltd.
British Insulated Callender's Cables, Ltd.	General Electric Co., Ltd.	Londex Ltd.	Roberts, J. W. Ltd.	Tyer & Co., Ltd.
British Insulated Callender's Construction Co., Ltd.	General Motors Overseas Operations	London Transport Executive Luwa, G.m.b.H.	Rolls-Royce, Ltd.	United Steel Companies, Ltd.
British Oxygen Co., Ltd.	Gloucester Railway Carriage & Wagon Co., Ltd.	Macdonald, John, & Co. (Pneumatic Tools), Ltd.	Rozalex, Ltd.	Williams
British Oxygen Gases, Ltd.	Godwin Warren (Engineering), Ltd.	Marconi's Wireless Telegraph Co., Ltd.	Ruston & Hornsby Ltd.	Vacuum Brake Co., Ltd.
British Paints, Ltd.	Greenwood's & Airvac Ventilating Co., Ltd.	Marcroft Wagons, Ltd.	Saunders Valve Co., Ltd.	Vanderveld Products Ltd.
British Railways	Gresham & Craven, Ltd.	Marsden, Samuel, & Son	Schindler Carriage & Wagon Co., Ltd.	Vokes, Ltd.
British Timken Division of The Timken Roller Bearing Company	Griffiths Bros. & Co. London, Ltd.	Matissa Equipment, Ltd.	Scottish Machine Tool Corporation, Ltd.	Vulcanised Fibre, Ltd.
British United Traction, Ltd.	Grover & Co., Ltd.	Metalstik, Ltd.	Scow Mill Ltd.	Walker, James, & Co., Ltd.
Bromesregulator Svenska Akt. Brown Hayley Steels, Ltd.	Hackbridge & Hewitt Electric Co., Ltd.	Metall Seamless Tube Co., Ltd.	Seitright Registers, Ltd.	Ward, H. W., & Co., Ltd.
Brown, David (Industries), Ltd.	Hackbridge Cable Co., Ltd.	Metropolitan-Cammell Carriage & Wagon Co., Ltd.	Shelfield Twist Drill & Steel Co., Ltd.	Ward, Thos., W., Ltd.
Brush Traction, Ltd.	Hadfield, Ltd.	Mills, The Exors. of James, Ltd.	Simon Engineering Dudley, Ltd.	Westpor, N.Y.
B.T.R. Industries, Ltd.	Hardy Spicer, Ltd.	Miner, W. H., Inc.	Skeffo Ball Bearing Co., Ltd.	Westinghouse Brake & Signal Co., Ltd.
Bull, John, Rubber Co., Ltd.	Harper, John, & Co., Ltd.	Mirreles, Bickerton & Day, Ltd.	Smith's Industrial Instruments, Ltd.	White, R., & Sons (Engineers), Ltd.
Bullers, Ltd.	Harvey, G. A., & Co. (London), Ltd.	Mitchell, Shackleton & Co., Ltd.	Smith, John (Keighley), Ltd.	Wild, A. G., & Co., Ltd.
Butler Machine Tool Co., Ltd.	Hackbridge & Hewitt Electric Co., Ltd.	Motors, Ltd.	Smith, Thos., & Sons (Rodley), Ltd.	William, Henry, Ltd.



*SHIPLOADS OF PROGRESS...180 G-E locomotives will soon be delivered to the Brazilian Railway System. These versatile workhorses will provide a total of 577 General Electric locomotives to form the heart of a vital transportation system. For greater railway efficiency, economy and profits... specify General Electric.*

120-18

PIONEER IN RAILWAY MOTIVE POWER  
FOR OVER HALF A CENTURY

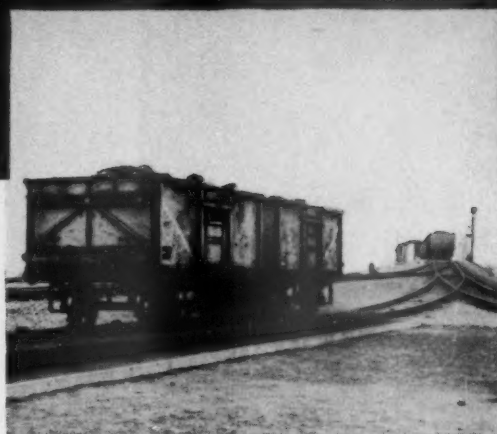
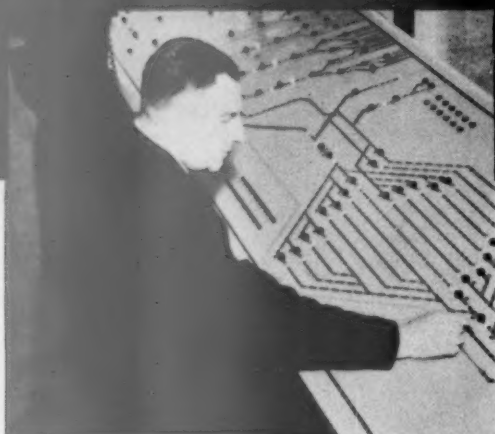
GENERAL  ELECTRIC

REPRESENTED THROUGHOUT THE WORLD BY THE INTERNATIONAL GENERAL ELECTRIC COMPANY • MAIN OFFICE: 159 MADISON AVENUE, NEW YORK 16, NEW YORK, U.S.A.

*The Railway Gazette* September 22, 1961



# THIS IS MARGAM



## Another 'first' for AEI-GRS equipment

33 miles of track . . . 50 sorting sidings . . . 4,000 wagons and 220 trains handled each day . . . this is the size of the Margam achievement. This fully-automatic marshalling yard with computer and radar control is a brilliant 'first' for Britain—and an outstanding achievement for AEI-GRS equipment which incorporates the following important features:

Fully automatic operation of retarders and points • Speed of 'cuts' controlled by radar • Computer for measurement of rollability and distance to run • Punched tape programming • Repeater of Hump signal in shunting locomotive cab • NX Route Relay Interlocking using miniature relays

AEI-GRS Equipment at Margam, British Railways, Western Region. (Left) Desk in control tower at Margam showing marshalling yard controls at left and Type NX Route Relay Interlocking controls (nearest camera). (Right) A 'cut' in a primary retarder. (Photographs by courtesy of British Railways)



**Associated Electrical Industries-GRS Limited**

132-135 Long Acre, London, WC2

Temple Bar 3444

